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Fish Men Explore a New World Undersea

By Capt. Jacques-Yves Cousteau

THE best way to observe fish is to become a fish. And the best way to become a fish—or a reasonable facsimile thereof—is to don an underwater breathing device called the Aqualung. The Aqualung frees a man to glide, unhurried and unharmed, fathoms deep beneath the sea. It permits him to skim face down through the water, roll over, or loll on his side, propelled along by flippered feet.

No cables or hoses connect the Aqualunger to the upper world. No heavy armor weights him down. Tanks strapped upon his back feed him compressed air in amounts carefully regulated to equalize the pressure within his body to the pressure of the sea without. In shallow water or in deep, he feels its weight upon him no more than do the fish that flicker shyly past him.

Meet the Fish—in His Own Home

For scientists who would explore the fauna and flora of the middle depths, the Aqualung offers unique advantages. It provides an opportunity to study marine life right in its own environment. Dredges and nets can snatch specimens of this life up to the harsh light of day. But only by on-the-spot investigation can biologists determine precisely at what level these creatures live, under what circumstances, and in what relation with their neighbors.

Such firsthand observation comprises all the difference between examining slain animals at a taxidermist's and observing them at large in their own woods and meadows.

In the winter of 1951-52 I took a group of scientists eager to exploit these capacities of the Aqualung on a voyage through the Mediterranean to the Red Sea. The object of our expedition was twofold: to study this area's rich undersea life, and to photograph it in its true colors. I think we can say that, on both scores, we succeeded beyond our expectations.

But let me tell you first a little about the Aqualung itself and how it came into being. I have been, all my adult life, an officer in the French Navy. As such, I sailed the Seven Seas—and swam in all of them. Yet I swam and dived as a blind man. Not until 1936 did a pair of sea goggles open my eyes upon a new, neglected kingdom.

From that moment I never looked back. With my companions, Frédéric Dumas and Philippe Tailliez, I dived the year round in warm and icy waters. I learned to perform the expert's surface dive, by which a man can descend 50 or 60 feet in a few seconds. I learned to kill fish with a spear, a crossbow, a cartridge-propelled harpoon, even—as I proved in a bet with a skeptical friend—a knitting needle.

Yet always I rebelled against the limitations imposed by a single lungful of air. I wanted to go deeper and stay longer. Accordingly, my friends and I began to tinker with various oxygen-rebreathing devices.

We built two homemade models that used oxygen and tried them out; we tested other variations. But the more we studied our problem, the more convinced we became that a better answer lay in the use of compressed air.

Evolution of a Valve

We knew there would be no particular difficulty in getting compressed-air cylinders to take below and in devising tubes to conduct the air to the diver's mouth. The task that confronted us, however, was to get a regulator valve which would automatically feed the compressed air to the mouthpiece in ratio to the diver's depth.

Journeying to Paris in December of 1942, I took our problem to a brilliant Parisian

 J.-Y. Cousteau, P. Tabbot, F. Dumas

Fish Men from the Sunlit Surface Swim Down to Ali Baba's Cave Off Cassis, France

Capt. Jacques-Yves Cousteau, co-inventor of the Aqualung, an automatic breathing device, led an expedition in 1951-52 into the Mediterranean and Red Seas. One object was to give scientists equipped with the lung an unprecedented opportunity to study underwater life. Submerging 120 feet, Captain Cousteau filmed these Aqualungers heading for a grotto rich in sponges and fish. Filtered sunlight sufficed for black-and-white pictures down to 200 feet. For color, flash bulbs of fantastic power were required (page 471). Seen against the glowing sea "sky," the divers' air bubbles look dark. Tanks of compressed air give men the freedom of fish, but danger lurks on their return unless they pause for decompression (page 448).

engineer, Emile Gagnan, of Air Liquide Cie., France's largest commercial gas firm.

"This is the kind of gadget we need," I explained to him. "Do you think we could ever design one?"

Gagnan grinned. He reached up to a shelf behind his desk and brought down a small plastic object. "Something like this?" he asked.

"Perhaps. What is it?"

"A valve I made for those infernal natural-gas tanks we've had to put on our cars. Same kind of problem, you know."

We went to work. In three short weeks we had blueprinted and built a "lung" which utilized an adaptation of Gagnan's automatic regulator. Then one chilly spring morning we took it to the Marne River outside of Paris.

While Gagnan sat comfortably on the bank, I waded into the muddy water and submerged. Failure. As long as I lay horizontally in the water, the lung worked beautifully. When I stood up, however, air escaped with loud bubbles, wasting great quantities of my supply. And when I lay head down in the water, I had trouble getting air out of the regulator.

Disconsolate, I crawled out of the water. We got back in the car and drove sadly to Paris. Yet we were closer to the solution than we knew.

We had arranged the intake and exhaust tubes on the lung in such a way that one was six inches higher than the other. Could

this mere half-foot difference in altitude be causing the trouble? Back at Gagnan's laboratory, we arranged intake and exhaust tubes at the same level and tried another test. The new system proved not only practicable but a sound basis for an exclusive patent.

Not till the summer of 1943, however, were we able to give our breathing device—which we christened the "Aqualung"—its first real sea trials. With Dumas and Tailliez I took the Aqualung by very gradual stages to greater and greater depths. Together we made more than 500 separate dives. It was autumn before we attained 130 feet. Then in October, Dumas, in one carefully planned and attested plunge, swam down to 220 feet.

Mine Sweeping by Aqualung

Quick to grasp the Aqualung's advantages, the French Navy requested me, after the Liberation, to train a team of divers. I gathered around me a group of young naval officers and seamen and established what we called the Undersea Research Group.

Day after day, Tailliez, Dumas, and I conducted underwater classes. We trained our men to dive with Aqualungs to 20 or 30 feet, take them off, exchange them with one another, and put them back on. Our intention was to rid them of any fear of the deep, to train them for emergency action, and to develop in them confidence in the safety and easy handling of their new "gills."

The work of the Undersea Research Group was not all research. We removed live torpedoes from a sunken German submarine. We found sand quarries under the sea, to be used in building an airfield. We checked the performance of a special type of Air Force practice bomb when dropped into the water.

On one occasion we went down and explored a sunken German barge loaded with armed magnetic mines capable of virtually wiping out the city of Toulon itself. The mines, incidentally, are still there, but the area has been "fenced off"; as yet, no way of safely de-arming them has been found, since they are sensitive to nearly anything—a magnetic field, metal, pressure, sound, or heat.

In 1948 the Government had officially declared the roadstead at Sète, in southern France, cleared of mines. This did not prevent one ship, two years later, from being blown up.

The Navy took over the operation, and I organized a section of 20 demining divers. Exploring westward from the harbor entrance, we found a rocky shelf 35 to 45 feet down in very turbid water. Underneath, German "Katy" mines had been devilishly placed in such a way that mine-sweeping hooks and paravanes could not get at them.

Rigging a special 75-foot diving tender for the job, we sent four teams of divers below in half-hour shifts. In five weeks we located 14 mines, put charges on them, fired them, and cleared the whole area. The Navy estimated that, with conventional heavy-suit diving equipment, this job could never have been done.

I was eager, however, to see our invention turned to more peaceful and productive use. One use to which it was clearly suited was undersea color photography.

Our first organized effort in this field took place in the spring of 1951 aboard chartered boats in the Mediterranean. It was, I think, a highly successful voyage; our diving cameramen produced still pictures of the depths with a precision and a fidelity to the actual colors of the twilight sea that were quite unprecedented.

But I was not satisfied. I wanted to acquire a floating laboratory, workshop, and diving platform more nearly adapted to our needs than rented ships with makeshift arrangements could provide. Also, I wanted to widen the Aqualung's scope of usefulness by making it available to oceanographers, marine biologists, and geologists for on-the-spot study of life far beneath the surface.

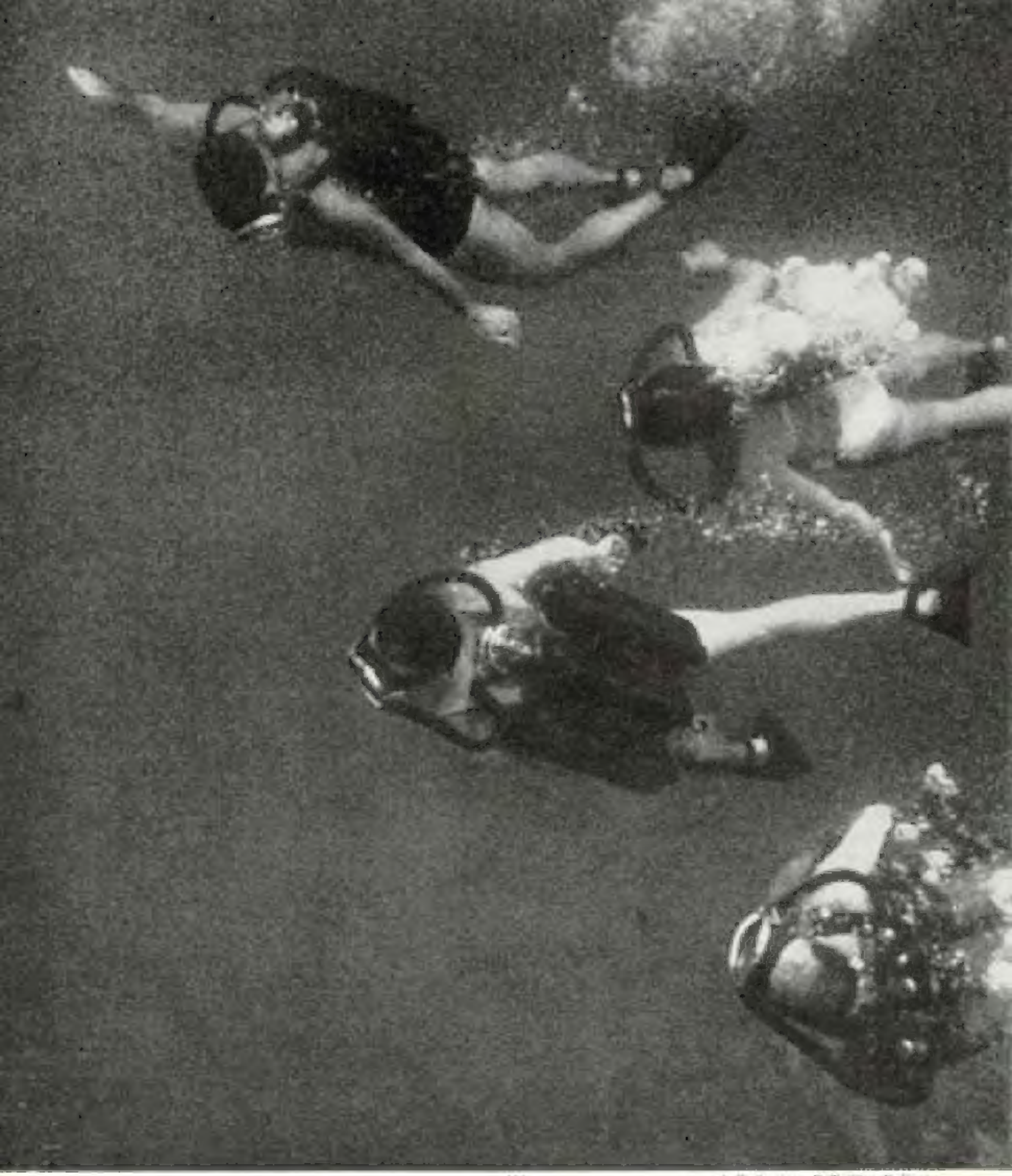
For this reason, I was delighted to be able to acquire at Malta an American mine sweeper which had been designated as war surplus. Taking it to the Chantiers Navals d'Antibes, on the Riviera, we put it in dry dock, stripped it down virtually to hull and engines, and completely remodeled it.

To finance work of this magnitude, we needed and received very substantial assistance from British and French individuals and firms, and from my friends in the shipyard itself. The French Navy also provided important help. Without all their enthusiasm and generous support, the *Calypso*, as we named our new home afloat, would never have gone down the ways (page 449).

Calypso Sails for Red Sea

The mine sweeper was equipped with sonar apparatus. To this we added a new aluminum flying bridge, a diving platform off the stern, an interior diving well (by which Aqualungers could descend through still water, and to which they could climb again into the heated ship without exposure to cold air), and a false prow containing portholes for underwater observation.

Finally, on the evening of November 24, 1951, after taking on last-minute supplies at Toulon, the *Calypso* glided down the harbor, outward bound for the reefs and underwater realms of the Red Sea. At 11 knots, guided by its automatic pilot, our ship moved briskly



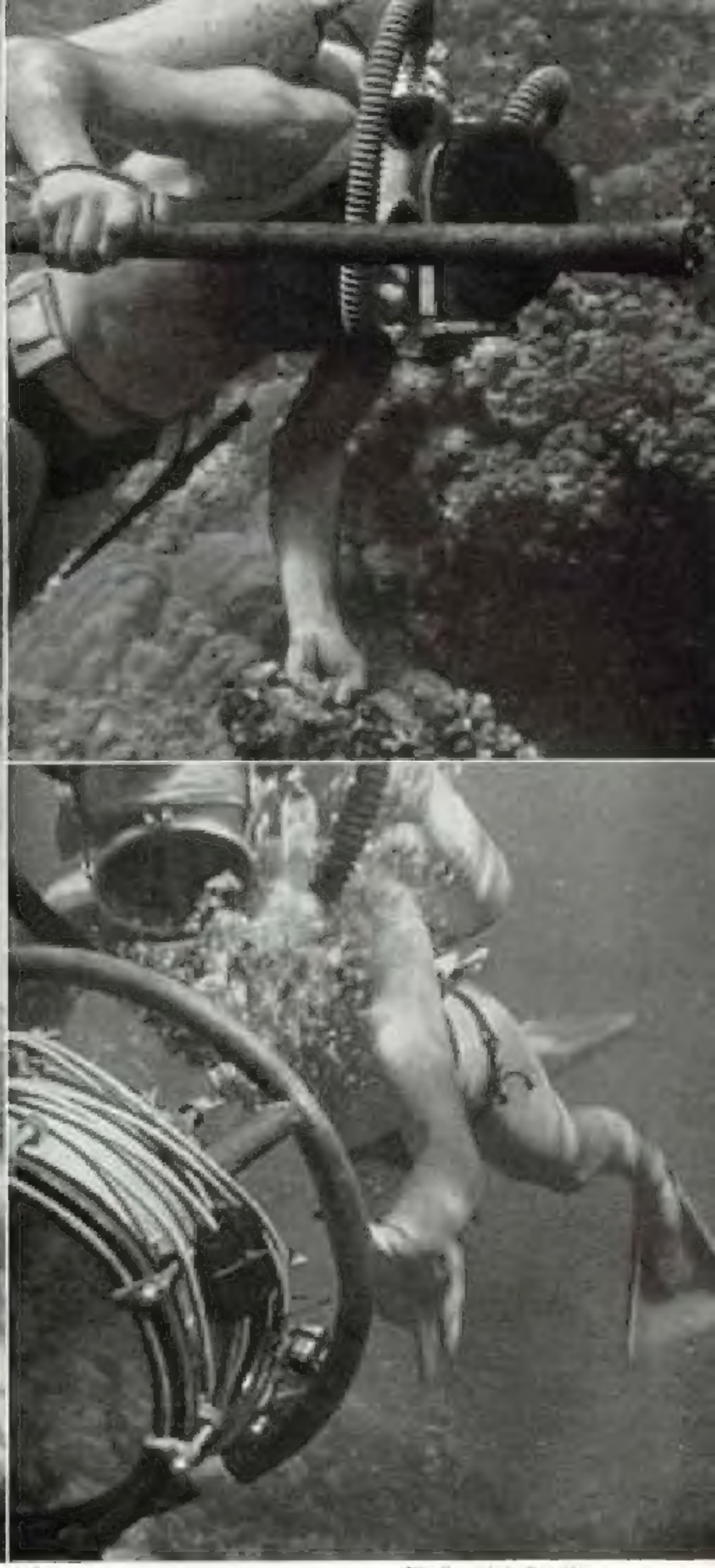
434 J.-Y. Cousteau, P. Tailliez, F. Dumas

Ninety Feet Down, an Aqualung Leader Signals a Right Turn for His Undersea Troop

Enemy of subsurface swimmers is undue exertion. Moving in a dense element, Aqualungers must learn to be languid. They use no arm strokes, but, kicking foot flippers, content themselves with a lazy crawl beat. More strenuous motion would drain their energy.

and unerringly toward Cap Corse (map, page 438).

For nearly three days the weather held clear and calm, a condition which allowed us to rest a little and to batten down the cargo carefully. Each of us stood a watch, either on the bridge or in the engine room. Lt. Jean Dupas, an Army parachutist on detached duty, shared the deck watch with our photographer, Jacques Ertaud; Dumas teamed up with Gustave Cherbonnier of the Museum of Natural History in Paris; our Belgian friend, Jean de Wouters, with Bernard Callame, deputy director of the laboratory of La Rochelle; François Saout, my executive officer, with Dr. Nivelleau de la Brunière.



Nicolas de la Brunière

Divers on Workaday Chores near the Surface Keep a Wary Eye for Sharks ✦

The Aqualunger's belt dagger (top right) was less popular than his "shark billy," a three-foot stick tipped with nail points. The latter weapon could fend off sharks without angering them. Flash-bulb reflector (bottom) has its own Aqualung to keep it pressurized.

The biologist, Claude Mercier, and the geologist, Wladimir Nesteroff, were assigned to the black gang with First Engineer René Montupet and mechanic Octave Leandri. In the galley, volcanologist Haroun Tazieff worked ardently with boatswain Jean Beltran. My wife, Simone, served as nurse, secretary, and assistant to Fernand Hanen, the cook.

During the afternoon of November 27 the weather changed for the worse, and after several stormy gusts the wind passed to the northeast, sweeping down from the Balkans upon the Ionian Sea. With each heave the prow leaped out of the water, sometimes even to the bilge keels, and plunged deeply into the following wave. Shaken up in its drums,

A Flippered Diver in a Rain of Fish Tours a Sunken Boat

Sunk by French sailors in November, 1942, the submarine net tender *Polyphème* came to rest in 60 feet of Mediterranean water off Hyères. Nearly a year later, Captain Cousteau in his newly invented Aqualung swam along its quiet decks. He found the rigging still taut, the rails only lightly encrusted with marine formations.

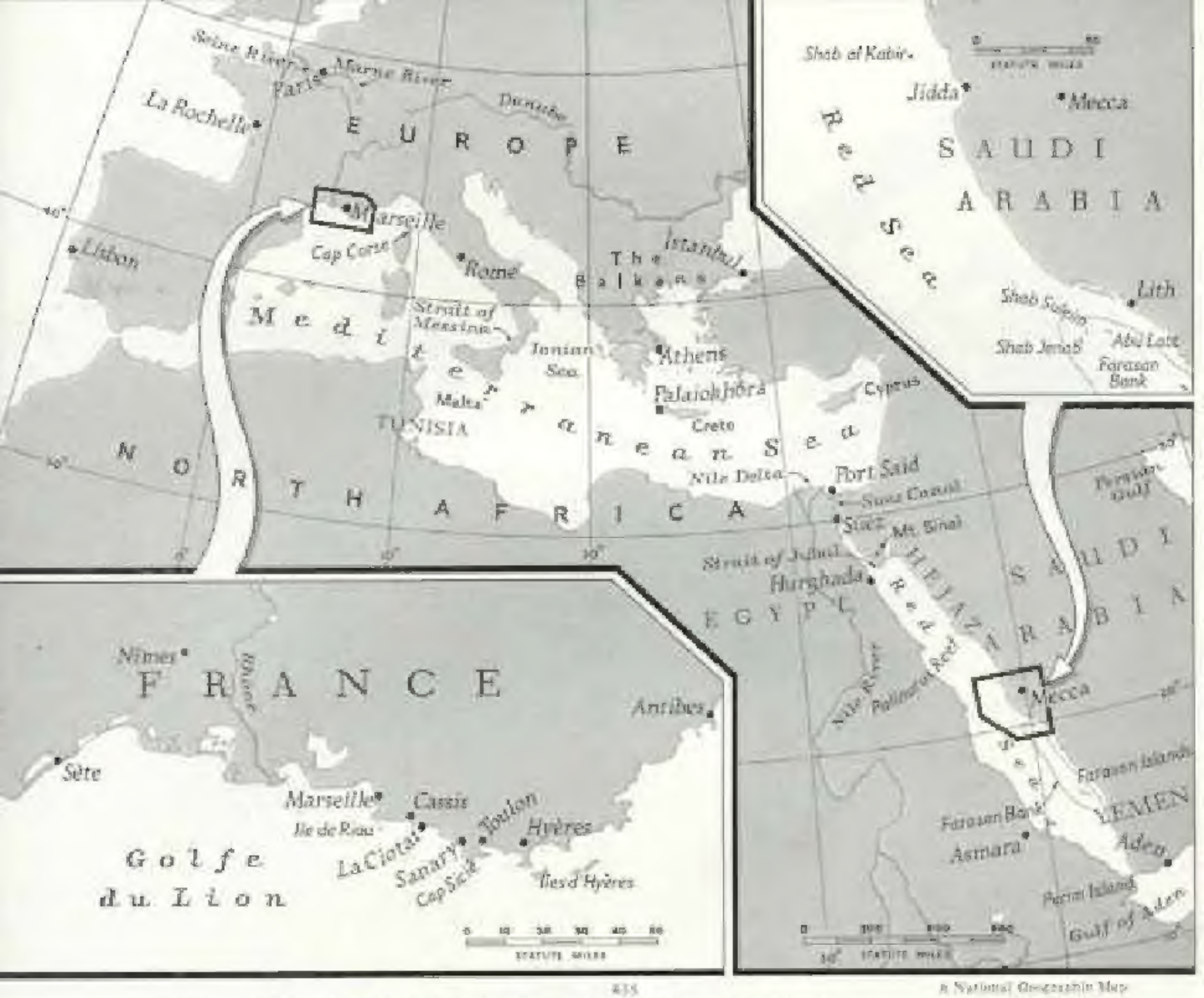
Sole tenants of the wreck were schools of fish which southern Frenchmen call *canagnoles* (sea bream).

Octopus Performs an Underwater Rumba

Mediterranean octopus, a far cry from imagination's strangler, is actually a small, shy creature prized for its flesh (page 454).

When a diver picks up an octopus, the animal tries to escape, and, if it succeeds, it departs by jet action, using water in place of burning fuel. At the same time it emits an inky smoke screen (left). To elude pursuit, it may suddenly drop and camouflage itself against the bottom. Finally tired by chase and handling, the octopus becomes submissive to "dancing" (right).

J.-Y. Cousteau, P. Taillez, P. Dumas



Calypso's Divers Spied Out Underwater Wonders in Mediterranean and Red Seas

Using their newly invented breathing devices, the Frenchmen groped among the ocean's grottoes and sunken ships off their own southern coast (lower inset). Then last winter they led a scientific expedition to study marine life in the Red Sea around Abu Latt Island, off Saudi Arabia (upper inset).

the fuel oil picked up dirt and gradually clogged the conduits and filters.

As a crowning misfortune, the transfer pump broke down. We ran on one engine at a time, and then both of them failed. A great sea heeled the ship to an angle of almost 45°.

But the *Calypso* rode it out, and, shortly afterward, Montupet managed to get one engine started.

Through the "Big Ditch" to Jidda

When the storm had subsided, we cast anchor in the cove of Selino Kastelli (Palaiokhóra), on the southwest coast of Crete, while Montupet worked on the filters to prevent any repetition of the engine breakdown. Careful inspection revealed no serious damage to the rest of the ship, though the cargo in the forward hold had been badly shaken up.

Once we got under way again, our echo sounder told us we were sailing over the end of the Nile Delta, which raises the sea bottom for more than 60 miles off the coast. During the night the first flying fish fell on deck. We placed it in Cherbonnier's bed as an initial specimen for his collection.

At dawn on December 5 we passed through the Strait of Jubal, with Mount Sinai, to port, a mauve patch on a rosy sky. To starboard, at Hurghada, behind serried ranks of coral reefs, lay the important Marine Biological Station of the University of Egypt. Leaving it in our wake, we made the Arabian coast near Palinurus Reef and steamed along it toward Jidda, which was to serve as our supply base (page 455).

Taking a fresh supply of food and water aboard, we weighed anchor at night, timing our course to reach the first reefs at daybreak. I was in the crow's-nest before dawn, scanning the southeast. Far away I saw a long white line: the breakers of Shab Jenab, among the first of the coral barriers of the Farasan Bank. This bank skirts the coast of Hejaz and Yemen for more than 300 miles.

As we edged cautiously past these treacherous barricades, we encountered everywhere

A Man-made Lung Gives This Diver an Hour's Permit to Explore the Twilight Sea

At 132 feet below the surface, atmospheric pressure on the body is 73.5 pounds to a square inch—five times as much as at sea level. But to diver Frédéric Dumas, skimming past coral branches in his Aqualung, pressure is no problem.

From the tanks strapped to his back, compressed air flows by tube to his rubber mouthpiece. Inhaled, it raises pressure within his body to that of the surrounding sea. Result: he feels no more discomfort than a fish in water or a man on the beach.

Dumas served as chief diver and deputy commander of a 1952 oceanographic expedition through the Mediterranean and Red Seas. Capt. Jacques-Yves Cousteau, French naval officer and co-inventor with Emile Gagnan of the Aqualung, headed the project.

Use of the Aqualung permitted Cousteau and his men to study at leisure the life of reef and grotto down to some 200 feet. It also made possible for the first time the photographing of that life in the true colors of the deep. Flashlights of intense brilliancy illuminated the twilight zone, and specially housed cameras recorded a vivid pigmentation never seen before even by the resident fish.

Dumas, here exploring a reef half a mile off France's La Ciotat, gathers an armload of giant gorgonians (corals) for examination. Their strong pigmentation, dimmed at this depth, will stain his hands bright red. Foam-rubber diving dress insulates him from cold water.

Deep-sea Exercise In Bend to "Pacific" by Aqualung

[illegible]

Rosy Damsels Swim Past a Sea Wall Dense with Marine Life

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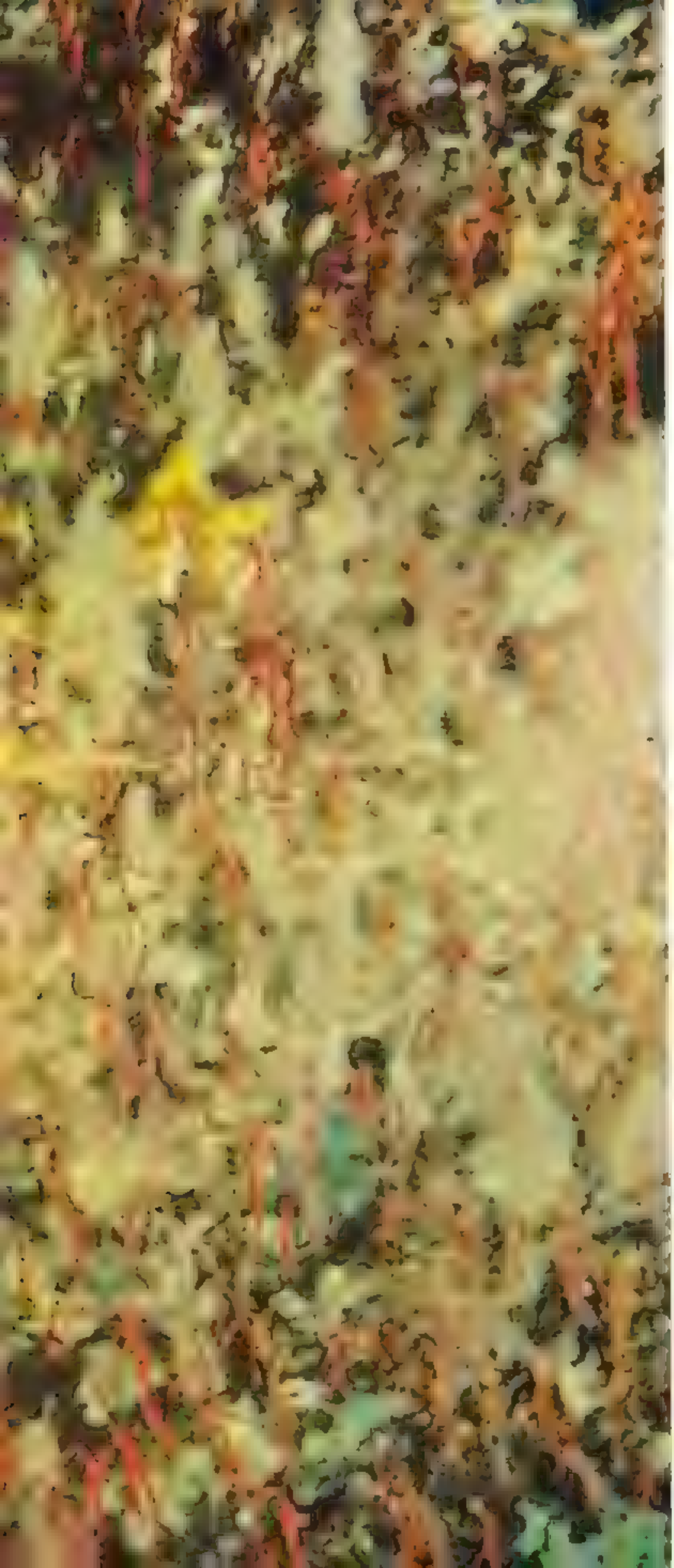
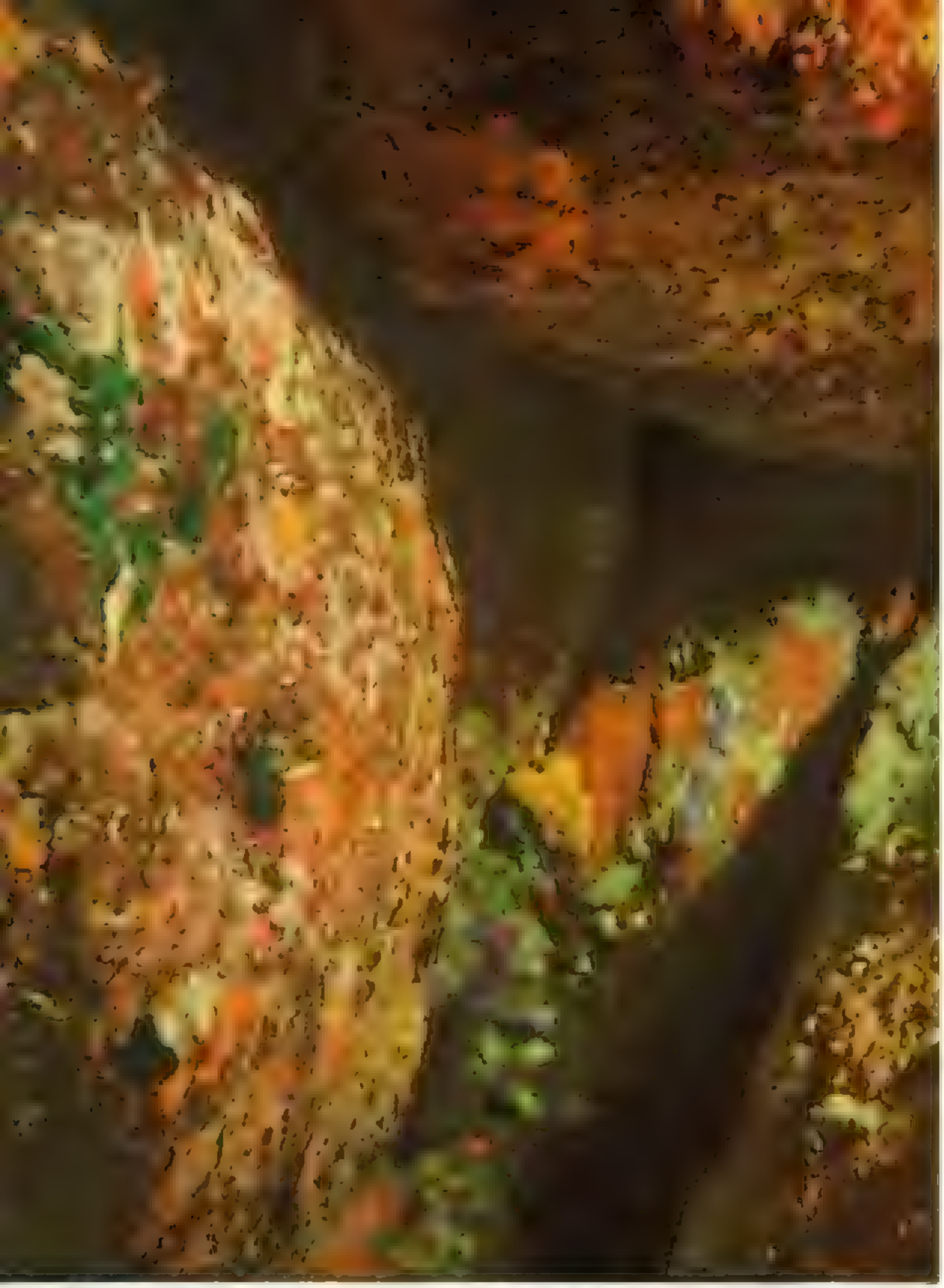


Downy Coral Blossoms Hang from Grotto's Wall Like Christmas Tinsel



Giant Plants in a Cave Left in Darkness Since the Sea Was Formed

[illegible]

A Nazi Torpedo Sank This Black Vessel

[illegible]

[illegible]

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A Flippered Visitor in Spider Crab's Cave

[illegible]

the curious spoor of the countless ships crossing beyond our horizon: burnt-out electric-light bulbs. By the dozens, they swung on the sand and bounced on the breakers. Out of all the myriad objects thrown overboard every day by sailors of all nations from Perim to Suez, only these fragile globes of glass seemed to have survived, floated over the jagged coral, and established their scintillating beachhead.

Faintly at first and then more definitely, a long dark silhouette defined itself on the starboard bow—the island of Abu Latt, objective of our voyage (pages 457, 460). An old, uplifted reef, Abu Latt is made entirely of fossil coral, even the sand on the beaches is a mixture of shells and pulverized coral. It boasts not a rock or a stone, but only an immense field of jagged coral in stem form, as pleasant to walk on as an overturned barrow. Around the island, a barrier of water-line reefs creates a kind of shallow lagoon. Beyond them stretches the saltest "open" sea in the world and the hottest after the Persian Gulf.

On this island, eight members of our expedition were to live and work for the next 38 days. Along a small bay on the eastern coast, easily accessible to the *Calypso's* small boats, they pitched their tents. The radio operator put up his aerial. Under Dumas's debonair direction, ten tons of food, equipment, and other supplies were ferried ashore in our shallow-draft aluminum barge and stacked. Gradually a small orange-and-gray village took shape. Its population: Drach, Cherbonnier, Mercier, Callame, Zang, Tazieff, Nesteroff, and myself.

Diving Begins Without Aqualungs

Once established, we set about our submarine exploration. As a preface, Prof. Pierre Drach gathered the divers around him and delivered a lecture on practical underwater work, stressing the differences between the principal species of madrepores, alcyonarians, ascidians, and calcareous algae.

Drach himself, a burglar's jimmy in hand, was to tackle the fixed fauna below. Dumas and Nesteroff were to contribute their skill as hunters, stalking and harpooning the bigger fish. Dumas was to conduct his own unconventional harvests by detonating TNT cartridges and then diving to scoop up everything that failed to float to the surface.

For the first two weeks we were forced to dive without Aqualungs; our brand-new air compressors resisted every effort to make them function. But the waters proved so rich in specimens that the dinghy, the raft, and the barge were soon brimful of samples destined for the large sorting table on the beach.

There Mercier and Cherbonnier selected, classified, and preserved everything of interest (page 461). Callame and chemist Jacqueline Zang, meanwhile, painstakingly collected samples of water from different depths and quadrants and noted their temperature, acidity, and proportion of oxygen, nitrate, and phosphate.

At long last, Monteret discovered what had gone wrong with the compressors: the diameter of the exhaust pipes was too small. To allow them more scope, he and his men promptly hacked a hole through the deck, and on January 3 the first 50-horsepower jerkers cut loose with a roar. Slightly deafened, but elated, we celebrated with champagne our imminent return to deep diving.

Rupture and Sudden Death

With our Aqualungs we were now able to descend to 200 or 300 feet. Actually, experience showed that our best operating level lay no lower than 213. To go farther exposes a diver, not merely to increased pressure (with its subsequent problems of decompression on the way up), but to a phenomenon known as "the rapture of the depths."

The chief symptom of this phenomenon is, to put it bluntly, the sensation of becoming as drunk as a boot owl. With some divers this intoxication begins to occur as early as 120 feet down; with others, not until 180 or 200. Mild elation grows into ecstasy; danger reactions tend to fade. Below 330 feet the Aqualunger may pass out, lose his mouthpiece, and drown.

Just such a fate overtook our diving companion, Maurice Fargues, during one of the experimental deep dives made by members of the Undersea Research Group. In 1947, Dumas, on a routine dive to discover what had fouled the drag cable of a French mine sweeper, had set the record at 330.9 feet. A few weeks later Fargues plunged down beside a rope hung with slates, wrote his name on one 367 feet down, tried to go farther, lost consciousness, and drowned. He had swum, free of any connection with the surface, deeper than any man before or since, had undeniably bettered his claim, but, tragically, had not lived to wear his laurels.

Physiologists believe that this narcosis resembles in many respects a gradual anesthesia. As the diver descends, his tanks feed air into his lungs and blood stream at greater and greater pressures. The blackout which sometimes follows is believed by some to be caused by increased absorption of nitrogen—four fifths of all air—into body tissues under pressure. The process was thus originally named "nitrogen narcosis."

More recent study by our group, however, has convinced us that the "rapture" is due also, at least partly, to excess carbon dioxide.

This gas, normally exhaled with every breath, is not properly discharged from the lungs under high pressure.

By constant diving under careful supervision our Undersea Research Group had built up since 1945 a considerable backlog of experience with the dangers of penetrating the "zone of rapture." Each of us knew what to expect, what impulses must be fought, what emergency procedures should be followed through sternly ingrained habit. Yet Fargues's fatal error kept us aware of the limitations of even the best training.

Narcosis was not our only danger. If we should dive deeply, stay too long, and ascend too rapidly, we would invite an attack of the bends, or caisson disease, which can be not only painful but even crippling or fatal.

Brooklyn Sand Hogs Named the Bends

It's an odd affliction with an odd history. Sand hogs building the great piers of the Brooklyn Bridge worked in underwater caissons subject to considerable pressure. Ignorant of the physiological strain they were imposing on their bodies, they would emerge from the caissons at the end of the work shift and double up with terrible pains in their joints. Fashionable women in that period affected a drooping posture known as the "Grecian bend." With a wry, self-deprecating humor, the sand hogs began to refer to themselves as suffering from the "bends."

Their trouble was roughly identical with that of any diver using compressed air. Their blood stream had absorbed a large volume of nitrogen under pressure. As they left one pressure zone for a much lighter one, the nitrogen left solution and coursed through the body's circulatory system in a froth of bubbles, like an opened champagne bottle, exerting an excruciating pressure against the nerves. This pressure hurt worst at the joints, because there, in the high fat content of the marrow tissues, it had been most easily absorbed and most intensely concentrated.

It used to be thought that, if a diver came up from a given depth at a uniform rate, he would escape the bends. Now we know that he can swim upward at any speed so long as he halts at certain levels for a certain number of minutes, depending on how long he has been below and how often. This is called "stage decompression."

Tables that tell how long a diver must halt at each stage have been exhaustively worked out by the British Admiralty, and more recently by the United States Navy, for any single dive. A major contribution of our Undersea Research Group, the personal work of Lt. Jean Alinat, was the construction of graphs, based on incessant experiments, which make those calculations for repeated dives by the same person within a limited period of time. It's a different, more complex problem, since the body's nitrogen tolerance varies intricately with the duration and intensity of its exposure to pressure.

We found, for example, that on the day's first dive to 100 feet, an Aqualunger remaining there for 35 minutes should halt on the way up at 10 feet for four minutes. On a second dive to this depth, however, made after an hour's rest, he should pause for 16 minutes at 20 feet and 10 minutes at 10.

Such figures presuppose the use of the three-cylinder model of Aqualung and its pressurization to 3,000 pounds, a level considered safe abroad. Federal regulations in the United States forbid the raising of air-cylinder pressures to more than 2,000 pounds; so the American manufacturer of Aqualungs has compensated by increasing the tanks' volume.

Whether tanks inflated to American or to European limits are used, one truth is abundantly evident: the Aqualung provides no absolute guarantee of immunity below. Properly and discreetly used by well-trained and well-supervised personnel, however, the Aqualung can make diving into the "middle depths" a rewarding experience.

We had all these facts well in mind when we made ready for our first dives by Aqualung down to the Red Sea's coral kingdoms. But one other menace remained to give us food for thought: sharks.

A fortnight before, while our compressors were still out of action, Nesteroff, the doctor, Drach, and I had dived from our barge, clad only in goggles, trunks, and flippers. Suddenly a 5-foot shark caught sight of us from about 30 yards. After a second's hesitation he rushed toward me at terrific speed.

Why me? I was sincerely convinced that I offered the least appetizing target among the lot of us. But I could not pause to debate the question. I was absolutely defenseless, and, even if I had had a weapon, the suddenness of the attack would not have given me time to use it.

What the Shark Taught Me

Fortunately, when he was only three feet away, the shark sheered around at 20 to 30 knots and shot off into the distance. I did not wait for him to make a second pass. I retreated to the barge.

There I pondered the way in which he had upset, not only our peace of mind, but some of our preconceptions about sharks. First, this fish had seen us from as far away as we had seen him. His eyesight, or some other sense, must have been very keen to permit him to find my position instantly. Second,

Compass in War Swept the Seas for Mines; in Peace Sea Explorers the Depths for Science

[illegible]

[illegible] in good [illegible] though we had [illegible] in some coastal waters, to be very [illegible]. I [illegible] the last [illegible] was simple and [illegible] of a [illegible] when I was [illegible] a [illegible] probably [illegible] to get out of the [illegible] [illegible] and often [illegible] cold.

This [illegible] [illegible] I was [illegible] expression [illegible] Nor [illegible] [illegible] expression [illegible]. In [illegible] [illegible] and [illegible] of [illegible] [illegible] and [illegible] to [illegible] below [illegible] and their constants. Some [illegible] passed by, [illegible] which [illegible] around us, [illegible] [illegible].

These [illegible] [illegible] generally [illegible] [illegible] but [illegible] [illegible]. If we turned our [illegible] [illegible], they would [illegible] [illegible] would go away for a moment, only to return. We decided that the important thing was to gain time and at the first opportunity to get [illegible] the world.

A Reflector Goes Down to Light Deep Water's Dusky Studio

Knob at camera center permits the photographer to see controls for the firing of a whole flash [illegible] a multiple detonation

In short, where at first we [illegible] our Aqualung [illegible] were prepared to [illegible] there in the [illegible] waters of Nassau Bank, we [illegible] with something of an inferiority complex.

Dumas, [illegible] and I were the first to go. Skimming through [illegible] hollows, we [illegible] the reef wall [illegible] overhung the blue abyss. Dead ahead [illegible] saw several [illegible] of them 10 feet long.

Cautiously we descended, keeping our backs to the cliff and holding in front of us our camera and special reflectors (pages 435, 460, and 472). Deeper and deeper we went, and [illegible] awesome became the sharks' menacing [illegible] they approached [illegible] world, [illegible] went away [illegible]

Are Sharks Cowards?

From [illegible] down we looked up and saw their long, dark profiles silhouetted against the shining surface. Below us we could see other sharks wandering over a shoal of sand. Seeing my companions swimming among these wild beasts, naked, and far from the safety of the upper world, I could only conclude that we were mad.

Yet already we were getting used to their whirling attendance. Dumas, in fact, soon lost himself in inspection of the sea wall while a big shark, 13 feet long, swam slowly toward his leg.

I could not restrain myself [illegible] the sight of that man calmly examining a small opening in the cliff, while an enormous *Carcharinus* sniffed at his ankles, unnerved me. I hooted through my mouthpiece as loudly as I could. Dumas gave no sign of hearing. Finally the great shark, majestic as an ocean liner, turned and slid away.

It occurred to me then, and our later experience seemed to confirm it, that we were actually safer at this great depth than nearer the surface. The shark which had made a pass at me the first day, I decided, had probably assumed I was just some helpless animal which could be eaten without a fight. Down here at this level, however, we probably looked like strange bubble-blowing fish with long tails, worth investigating but not [illegible] to chase.

Chased by a Triggerfish

One other thing made me think I was right. We had found that, when we exploded a cartridge under water, we had to corral our specimens at once or the sharks would arrive and eat them under our eyes. Yet, alive, those same fishes would swim without fear among sharks. One day, in fact, Beltran and Dumas had seen a triggerfish, an inoffensive little four-pounder, amuse himself by rushing at a shark and chasing [illegible]

It is one thing, of course, to become intellectually persuaded that a 10-foot shark means no harm, and another to convince one's nerves. Yet familiarity did begin to breed in us a certain healthy contempt for these tigers of the deep, and we turned our attention to other things.

There was much to see and much to be seen by. Giant hump-headed parrotfish, powerful jacks, shoals of blue bonitos and silver sardines, all flocked to have a look, [illegible] lingered for a moment, then with a shrug their fins flitted away. Great holefish floated by, but always fast enough. One of them was attacked [illegible] ten right in front of us by a [illegible] brown-velvet fisher.

[illegible] the coral blocks we skimmed past looked like the [illegible] of dwarfs; others, of giants. Other and massive tufts alternated with [illegible] of coral that resembled [illegible] petrified heather. Red organ-pipe coral (*Tubipora musica*) clung to the [illegible] wall like [illegible] Graceful parasols of *Acropora* coral spread their filigrees as if to shelter their tenants. [illegible] red and gold and spotted [illegible]

Divers Dive Like Corks
from a Sub's Hatch
120 Feet Deep

"Don't Tread on Me." Sting Ray Says It with Barbed, Whiplike Tail

[illegible] they could never [illegible] the barrels of [illegible] Mediterranean. [illegible] poisonous-filled weapon [illegible]

On the bottom crawls the sea urchin, which chews tunnels in the rock. Hold one shell but open and you hear only [illegible]. Venture into one and find it is a cloud of little gray, black and blue coral fishes [illegible] my world's worst swallow [illegible] the [illegible] of these [illegible] [illegible] the [illegible] after we [illegible] back of [illegible] when it [illegible] [illegible]

Ballet in the Grottoes

Along the reef's sheer wall grew [illegible] of [illegible]. Here and there still at shallow depths [illegible] [illegible] which fluttered there like [illegible] [illegible] the waves of [illegible] swaying their cue. Everywhere we saw frightened little [illegible] [illegible] clinging to the wall.

These grottoes of dead coral are [illegible] with a great variety of marine flora and fauna—coralians, sponges, hydrozoans, calcareous algae. Innumerable daubs of color like the random pattern of an artist's palette. In and out swam schools of yellow-spotted groupers, butterflyfishes, with their gold and blue [illegible] fish as flat as saucers, carrying long antennae like those of an auto radio; trigger fishes, electric blue or green and yellow; unicornfish, greenish gray, with a horn in the middle of their foreheads.

All in their Sunday best [illegible] milled about the reef [illegible] like a crowd at the opening of a [illegible] exhibition. Looking on the [illegible] moray [illegible] their snakelike bodies into crannies along the cliff and gawked with open mouths at the motley throng.

From time to time an especially [illegible] object attracted our attention. [illegible] tiddless near the bottom, it looked like a wad of tousled feathers or a headless and tailless milliner's bird. On closer inspection we recognized it as a lion or firefish, whose head seems to disappear in the middle of its

[illegible] one of the [illegible] is strictly vertical, a fact which [illegible] [illegible] when we [illegible].

The dominance of [illegible] [illegible] and color [illegible] a maximum between [illegible] and 50 feet. Here in addition to the [illegible] of [illegible] we could discern innumerable worms, small spiny crabs, and colored [illegible] which crowd [illegible] [illegible] in [illegible] [illegible] colonies developed to the size of trees, and whiplike horny coral trailed in the water like abandoned lamp cords (page 469).

At 130 feet, where light and color diminish, [illegible] and I [illegible] the scenery familiar. We [illegible] these [illegible] Ile de Riou, off the southern coast of France. Here were the same loggias cut into the dead wall, the same [illegible] and calcareous [illegible]. The only thing we missed were the lobsters which, in the Mediterranean, lounge on balconies like these.

Scientists Check Sediment Dredged from the Red Sea

At 200 feet the cliff came to a halt, and a ramp of sand and mud sloped away at 45 [illegible]. [illegible] we detected at 260 feet [illegible].

I [illegible] it [illegible] to imagine how [illegible] reef had [illegible] except in terms of the Darwinian theory. Starting from a preexisting rock base, close to the surface, the corals must have begun to form toward the light. Their growth rate doubtless corresponded with a very slow sinking of the sea bottom. As the [illegible] gradually thickened, [illegible] would have dropped to a depth where the microorganisms building it tended to [illegible] and all construction ceased.

Certain parts of the reef seemed particularly rich in fish. Sometimes we passed through schools so thick that we could not even see through them, much less avoid them, and against our skin we felt the tap-tap of thousands of little snouts.

TNT Brings a Rain of Fish

Into one such shoal [illegible] gram cartridge of TNT. [illegible] of tiny fish, colorless and [illegible] 100 feet around. Another experiment brought up [illegible] pounds of coral [illegible]. Caught on [illegible] reef, they formed a [illegible] with colors [illegible] and shapes so strange as to wring a gasp of admiration from everyone aboard.

After death, the colors faded and the [illegible] tarnished. But by color photographs taken immediately, we were able to [illegible] at least on film their pristine beauty (pages 466, 467). Our marine biologists, [illegible] and [illegible], had little time, however, in post-mortem [illegible]. They filled up their jars.

"I love animals," said Cherbonnier, dropping one in a jar of formaldehyde. "What an irony that I must kill them to study them!"

It took us some days to catch on, but soon we became aware that mealtime, off our Red Sea island, was strictly kept. Twice a day, morning and evening, as if regulated by the sound of a gong, the sea began to bubble, and the dorsal fins of bonitos and jacks cut the surface like scythes. By the thousands their victims, small, silvery fish, leaped in panic from the water, and the pursuers, in the excitement of hunger, often flopped from the surf to the beach, helpless until a kindly wave swept in to carry them back to sea.

Pelicans Join the Feast

Over this battleground the boobies swooped and dived, plummeting with folded wings beneath the surface and swimming under water toward their prey with outstretched necks. As for the pelicans, they paddled about in the middle of this massacre, long beaks plunging deeply into the water and rarely missing their target. For half an hour the slaughter would continue. Then, when appetite had been sated, an uneasy truce would prevail once more beneath the sea.

One fish which seemed to enjoy making fun of us was the hump-headed parrotfish. On our first dive at Shab Jenab we at spotted a dozen of them. Weighing about 65 pounds each, greenish blue and orange in color, they had swum in our direction, circled us, then turned majestically away.

We looked at each other in wonder. They were big fishes, more than a yard long, stockily built, with powerful fins, a heavy mouth, and something like a parrot's beak instead of teeth. On their foreheads they displayed a sort of whitish protuberance as disproportionate as the nose of Cyrano de Bergerac.

After that first meeting we tried to get better acquainted, but they remained standoffish. We would see their fins or tails breaking the surface of the water every day, often in lagoons so shallow they could hardly swim, and one day from the top of the north isle we watched a school of some 200 parrotfish along the coast.

Sometimes, too, we would spot them when diving. Always, however, they would dash away, and neither Dumas with his explosive, Dupas with his gun, nor Nesser off with his cartridge-propelled harpoon could capture a single specimen. The best we could do was to catch them on Jean de Wouters's stereo color film.

But on January 22, while diving for the last time at Shab Suleim, De Wouters, Beltran, and I stumbled at last upon a striking pair of hump-headed parrotfish. We had been cruising along the reef wall when Beltran, signaling with his arm, suddenly pointed in the direction of the lagoon. There, in scarcely three feet of water, swam our quarry.

Slowly we turned toward them, trying by the most unobtrusive motions not to alarm them. Our caution paid off. For once the big fish did not flee; they adopted us. Side by side we floated through the shallows, an eerie but exhilarating experience.

Then we noticed a curious thing. From time to time these fish would charge against the coral. Their beaks would close with a crunch, and a white scar would appear on the reef. Unhurried, they would repeat this operation again and again—sea cows, browsing on stone pastures.

Between bites, they ruminated with closed mouths, crushing the coral with their pharyngeal grinding mill. To obtain a tiny amount of assimilable living matter, we deduced, they must have had to swallow an enormous quantity of coral; at the rate at which they were eating when we watched them, we estimated they could consume about 10 tons of coral apiece every year.

Every now and again they would eject behind them a big cloud that muddied the water for a cubic yard. I swam near one of these clouds as it fell slowly to the bottom in small white grains. It was sand, the same kind as that covering the lagoon. Clearly, we had found one of Nature's reef-building machines at work.

This parrotfish and others, we felt sure, must be by far the biggest coral crushers on the job. It would be in large measure their product, along with that of other reef-building plants and animals, which the sea currents and the wind would use to build the kind of small, low sand islet which is found all along the Farasan Bank.

Octopus Gentle as a Kitten

Another creature of the deep which interested us greatly was the octopus. Well-meaning friends brought up on the literature of Jules Verne and Victor Hugo had solemnly warned us of the dangers of being caught and devoured by these nightmarish devilfish.

The octopuses we met in the Mediterranean (we found none in the Red Sea, although other expeditions have done so), seemed far more frightened of us than we of them. Shyly clinging to the reef and resorting to camouflage, they proved to be the most bashful of walkabouts. It was only after nearly an hour of determined play with one that Dumas persuaded it to accompany him in an odd little dance before our camera (page 437).

Jet propulsion, we found, was an old story to the octopus. We watched them propel

Jeddah's Sun Shines on Peace and Tolerance

[illegible]

Armians Prepare to Board *Celebes*

[illegible]

Also Lots, Red Sea's Coral Islands, Offered a Strange World to Explore

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Man-fish Threads His Way Gingerly Through an Eerie Poison Garden

[illegible] of [illegible] for Neptune's [illegible] garden, [illegible] an allergic [illegible] poison [illegible]. The [illegible] with all the [illegible]

Diver [illegible] compress[illegible] tank [illegible] operating [illegible] depth. The farther down he goes, the more compressed air he needs [illegible] the sea's [illegible] pressure.

Under the water [illegible] Aqualung weighs [illegible] pounds. [illegible], with its [illegible] full of air compressed [illegible] pressure [illegible]. As [illegible] becomes even lighter.

The diver [illegible] weights [illegible] to seven pounds, according to his personal gravity. With [illegible] achieves a perfect balance [illegible] however, [illegible] with the [illegible] of a fish.

Flippers on his feet propel him at a [illegible] speed of [illegible] knots. Hands serve as rudders.

Four men were required to make this picture: the model, the cameraman, and two assistants holding flash lights. All wore Aqualungs.

[illegible] on the [illegible] generally [illegible] Aqualungs allowed [illegible] to observe [illegible] and [illegible] in their true environment. [illegible] provided a [illegible] of samples for laboratory [illegible]. [illegible] study of the [illegible] of the sea, there was no [illegible] for on-the-spot observation.

National Geographic Society

[illegible]

Scientists Pitch Camp on Axel Lutt Island and Sort Their Haul

The Red Sea Yields Samples of Its Intimate Viands

[illegible]

[illegible]

Needlefish May Be More Graceful, but Tools Sometimes Trouble Them

[illegible]

[illegible]

Arab and Frenchman Have Much to Talk About. Dachshund and Sharp Do Not

[illegible]

Over the Stern Go Aqualung Divers and Cameras

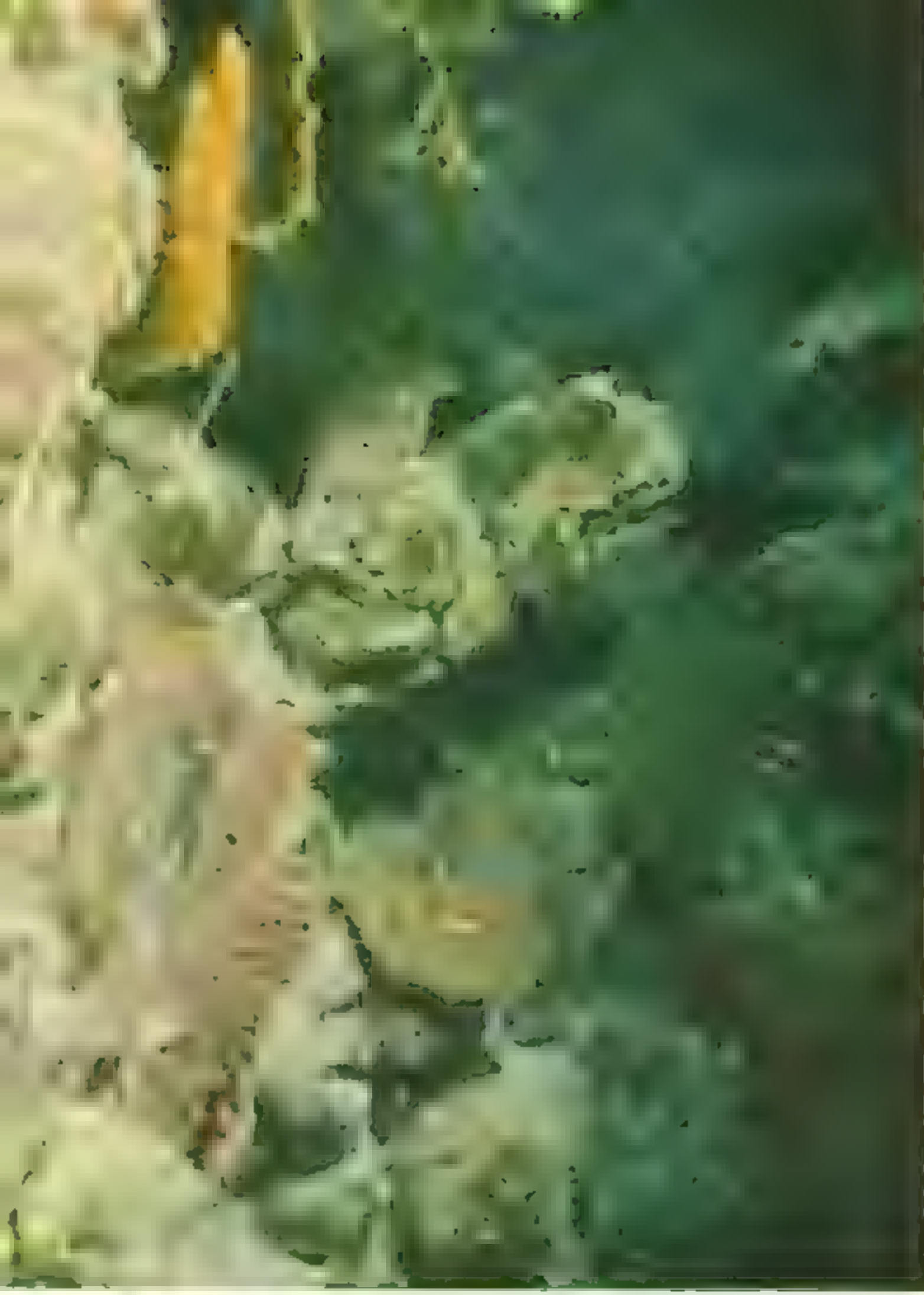
Sharks Prowled Around the Divers, but Gave Them Guarded Acceptance as Strange Bubble-blowing, Two-tailed Fish

[illegible]

A Cloud of Pastel Fishes Drifts Through a Shallow Forest of Red Sea Coral

[illegible]

Some Reef, 110 Feet Deeper Reveals Hues Which Only a Powerful Flash Can Illuminate



Red Sea's Twilight Zone: A Battery of Sponges Stands at Attention, and a Freckle-faced Fish Guards His Coral Hide-out

[illegible]

A Second Lake Mummied Fish Vanished Like Flies in Rock Crannies

[illegible]

Same Parasol Shelters Dunnas and Squirrelists

[illegible]

themselves by sucking in water and expelling it [illegible] them release their notorious "ink." This murky cloud is neither camouflage nor a venomous screen, though other recent investigators say the "ink" is slightly caustic and therefore distasteful to fish. However, too small actually to hide the octopus, the cloud may well be meant to represent a false octopus, a vague sort of decoy designed to fool weak-eyed pursuers.

A diver can easily outswim an octopus, which usually flutters quickly to the bottom, spreads out, and pretends it isn't there. Prodded, the octopus will make one despairing leap and then become as docile as a tabby cat.

We saw all this in the twilight zone of the sea, where the spectrum's red waves were filtered out, where red coral appeared dark blue, carmine gorgonians seemed violet, and blood flowed emerald green. We knew it would take many months before the biological specimens collected in this stratum would undergo final analysis and before scientists could or would launch their first tentative generalizations on the life we had explored.

But one thing we had for sure: photographs. Men have looked into the sea before and taken pictures through windowed boxes, through the portholes of bathyspheres,* and, clad in cumbrous helmets, through the tropic shallows. No one to our knowledge, however, had ever swum down to great depths and with artificial light of great intensity caught on film the actual colors of the fish's kingdom.

Treasure from a Roman Argosy

My own experiments had begun four years before. Like most scientists and divers, I had assumed that pigmentation 50 or 100 feet below the surface was pallid and uninteresting. Then, in the summer of 1948, Taillez, Dumas, and I had dived by Aqualung down to the wreck of a Roman vessel sunk in 140 feet of water off Tunisia. It had been built by Sulla to transport loot from the sacking of Athens. From its deck I brought up three marble columns and two Ionic capitals, part of a Greek temple which apparently had struck the fancy of the emperor.

Though daylight had appeared to illuminate these fragments well enough on the sea bottom, where they seemed a dull gray and brown, I was not prepared to find at the surface that their encrustations of algae actually glowed with violent reds and oranges.

Determined to defeat this capacity of deep water to screen out the more brilliant colors, I started at once to improvise systems of bringing adequate artificial light below. Attaching a powerful lamp to a surface connection, I took it down to the twilight zone, 150 feet below the surface, and there, on 35-mm. Agfa color Cine film, took the first pictures of the depths in their true colors.

Since we wished to check the behavior of color emulsions and flash bulb lights under the sea, we were forced to try many combinations of both daylight and interior flash film as well as blue and natural bulbs. We diversified these permutations even more by dipping the bulbs in tinted varnishes of several colors.

The cameras we used were not unusual in themselves but their housing was. We built into them enough air ballast to give them a positive buoyancy of one pound, which both assured their easy handling below and their ability to float if we had to drop them.

Even the Cameras Wore Aqualungs

We did more. We permitted our cameras, like ourselves, to "breathe" at any depth. To each was attached a miniature Aqualung which fed it compressed air in proportion to the increase in pressure of the sea around it (page 440). The diver simply opens a valve on the camera at the surface, allowing air to enter the regulator. Thereafter, as he swims downward with the camera, its regulator automatically adjusts the intake of compressed air to compensate for each additional foot of depth.

A further refinement we devised was to mount our Rolleiflex on a shaft with two pistol grips. The diver trains his camera on the subject like a charging submachine gunner. By revolving one grip, he can change the focus; the other alters the aperture.

Our principal problem, of course, was always one of light. The most powerful flash bulbs we could obtain gave an illumination of some 5,000,000 lumens—about 400,000 candlepower. On land, such a bulb exploded at night will make possible a color shot 50 feet away in $\frac{1}{500}$ of a second. In the twilight sea, dense with its quintillions of microscopic organisms and suspended minerals, a similar [illegible] to set off eight bulbs of this power at once will illuminate, for color purposes, only an additional seven feet.

When we took our underwater photographs on the *Calypso* expedition, we usually employed four Aqualung divers—one to man the camera, two to carry the lights, and one to act as subject.

It was an eerie studio in which we operated. Down from the brilliant surface we would glide, past the cliff dwellings of a thousand fish, into the dusk of 150 or 175 feet below,

* See, by William Beebe, in the National Geographic Magazine: "Half Mile Down," December 1934, "Wonders Under Sea," December, 1932; "Depths of the Sea," January, 1931, and "Round Trip to Davy Jones's Locker," June, 1931.

This Diver Overtook an 8-foot Shark, Then Boldly Tweaked Its Tail

[illegible] off the Cape Verde Islands dived. Dumas met the [illegible] its attendant pilot fish. [illegible] and two blue sharks broke into the party. Captain Cousteau [illegible] one intruder with [illegible] to 10 feet the usual respect [illegible] or shark worker, beneath this monster [illegible] the [illegible] seemingly pushed ahead by a cushion of water

Cousteau opened out from the sea wall, darted and retreated. The water seemed as the depths lay upon us like a benediction.

With Dumas [illegible] passageway, I would attempt to position the [illegible] the [illegible] and [illegible] by backdrops on the [illegible] would be stabile. I and my camera [illegible]; the reflector men floated; Dumas, easing through his coral corridors, floated.

All would be ready. Pressing the [illegible] button, I would explode our [illegible] bulbs and trip the camera. The darkness would flower for a brief instant into blinding light [illegible] the [illegible] would be [illegible] and [illegible] more. We would [illegible] nots, mutter "I think the color was there, alright," and return to our world above.

Not until the film was developed would we feel certain that the miracle was indeed wrought: that at depths where neither fish nor man could [illegible], color [illegible] and as beautiful as [illegible] of the surface. We do not know why [illegible] or what purpose, if any, they serve. But they are there.

All [illegible] attempts to [illegible] the [illegible] seen. We, I think, are in a different position. For here the photographs themselves are the real marvels.

We offer these pictures to you now with [illegible] patient [illegible] in the [illegible] of [illegible] men who made them possible and [illegible] for [illegible] we have been able to [illegible] color—the world of the twilight depths.*

* *The Silent World*, by Captain [illegible] with [illegible], published by Harper & Brothers, New York.

Pack Trip Through the Smokies

You Can Ride Part Way into the Great Smoky Mountains National Park, But in "the Wilderness" You Must Leave Your Horse and Go on Foot

By Val Hart

Kodachrome by National Geographic Photographer Robert F. Sisson

"ABOUT that groundhog you saw yesterday," Sam said, "did you know they make mighty fine eating? I'll tell you how we cook them. First you got to get yourself a nice fat young groundhog, dress it, and boil it."

Sam paused to throw a log on the fire, then continued. "Now, if you're out in the woods, you get sassafras or spicewood for season; then you take the meat out of the water and bake it." He smacked his lips.

"Has a wonderful flavor," he said. "Couldn't tell the difference if it was coon or bear."

This introduction to mountain cooking made my kitchen in Washington, D. C., seem far away. We were on a pack trip through the Great Smoky Mountains National Park, and by now our horses had taken us deep into the mountains (map, pages 476-477).

Escape from "Modern Living"

My late-September vacation was an escape from television, banging screen doors, and the gray routine of housekeeping. No change could have been more complete, for I had never camped before nor ridden a horse very far. I glanced at the friendly and now familiar faces lit by the fire and thought how odd it was that only a few days before we had been strangers.

We had met at Tom Alexander's Catalooche Ranch near Waynesville, North Carolina. Tom, rancher and forester, was our outfitter and guide. For years he has taken pack trips into the Smokies, and he knows every trail, ridge, and stream. In his very quietness at that moment he seemed a part of the mood of the hills. So did Glenn Messer, Tom's helper, and Sam Woody, our camp cook.

The rest of us Tom called his "trail riders": Ruby Bere, a bacteriologist from Madison, Wisconsin; Genevieve Bass, a housewife from Lakeland, Florida; Elizabeth Yates, a writer from Peterboro, New Hampshire; [illegible] a staff photographer for the NATIONAL GEOGRAPHIC MAGAZINE, and I.

We were up early for the first day's ride. Tom gave us last-minute instructions: Don't tie a horse close to another until you learn their preferences—some horses hate each other; keep a distance on the trail; watch out for yellow jackets; and hitch up with the halter rope, never the reins.

"Come on, you cowpunchers, let's get going!" Tom yelled, and led the way from [illegible] steep climb from the ranch house. Ruby and I glanced at each other. Both inexperienced riders, we were pleased that our horses took their place in line and moved at all (page 479).

We entered the park and headed northeast along the crest of Catalooche Divide. From this height of 5,100 feet we watched clouds in the long distance drifting low, merging with deep haze and veiling the tops of the Plott Balsams, Mount Pisgah and Pisgah Ridge and Mount Sterling.

This blue haze, which looks like smoke rising to the sky, gives the mountains their name. Except for treeless balds on isolated peaks, the dense vegetation of the valleys extends to the top of the highest spruce- and fir-covered mountains.

This section of the Appalachian Mountains astride the border of North Carolina and Tennessee, the highest mass in eastern United States, is too far south to have a true timber line.* Many of them tower a mile high; to [illegible] level. Timber Line in this area would not begin at less than 10,000 feet.

The trail narrowed suddenly, and we passed through a jungle of rhododendron, the first of hundreds we would see. Masses of dog hobble (*Leucothoe*), dense and intertwined with the trunks and branches of rhododendron, covered the forest floor. So thick was the growth that only occasional patches of sunshine lit bright-red partridgeberries growing along the trail.

Mountain Berries Ripen Late

The Smoky Mountains, we soon discovered, conceal surprises for those who venture off the park highways. From the quiet darkness [illegible] sunlight of a meadow of goldenrod, sunflowers, purple and white asters, and vagrant butterflies. Ripe blackberries and blueberries dotted our trail; at lower levels the fruit had ripened several weeks earlier.

Leaving the crest of Catalooche Divide we turned northwest into McGee Branch Trail

* See "Rambling Around the Roof of Eastern America," by Leonard C. Roy, NATIONAL GEOGRAPHIC MAGAZINE, August, 1946.

Blue Haze as from Fire Gives These Mountains a Name: the Great Smokies

[illegible] highest mountain [illegible] from Mount [illegible] [illegible] the [illegible]

for the sharpest descent of our entire trip— [illegible] On the way down [illegible] for below, and the tops of [illegible] tall trees still lower. I wondered [illegible] to the [illegible] [illegible]

In the quiet valley of [illegible] we passed several abandoned cabins. [illegible] Mountain people had lived here years before the Government acquired the land for a park. But now [illegible] off bark of [illegible] trees [illegible] remained in the loneliness.

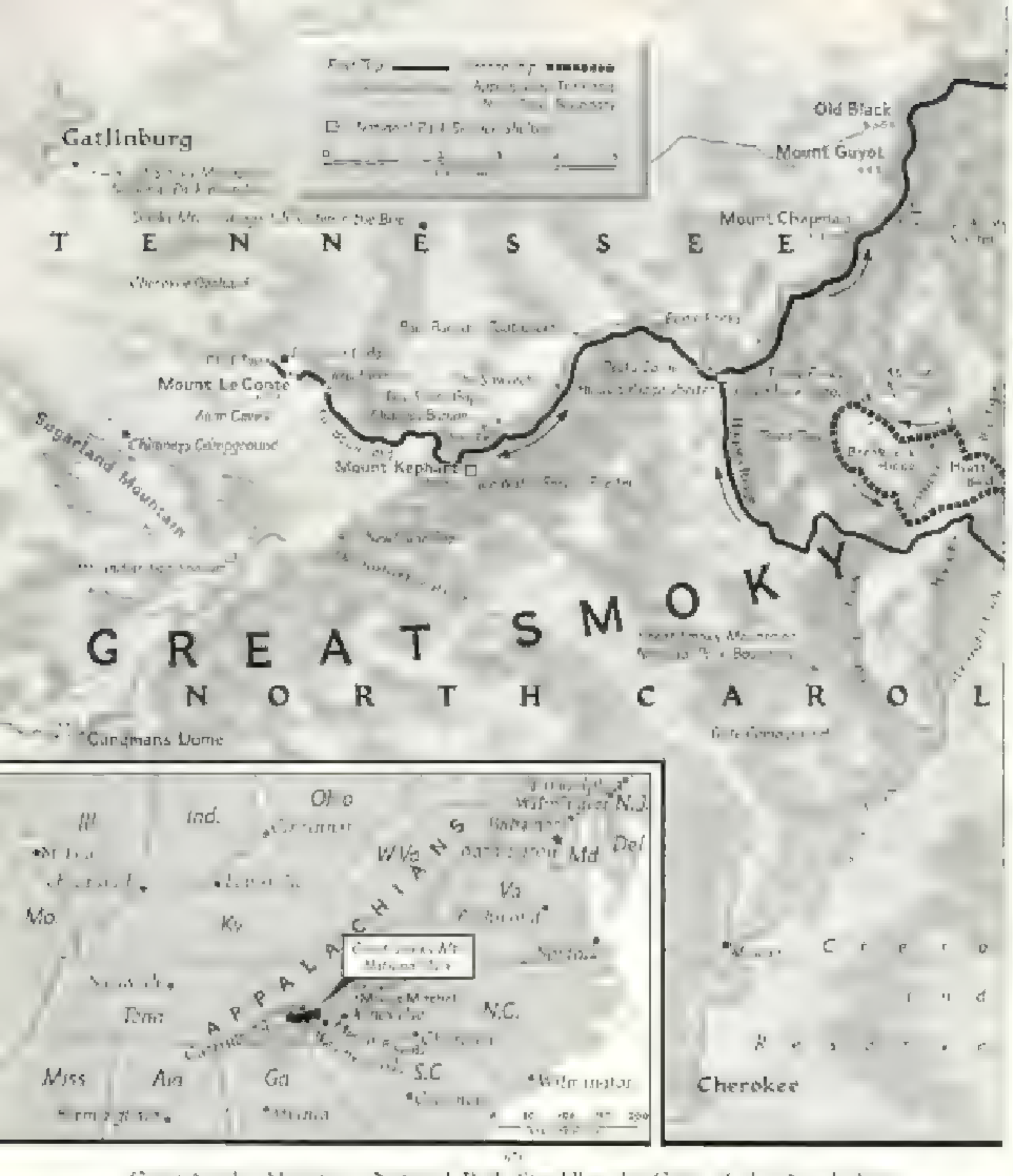
Our first night's camp [illegible] Fork of Cataloochee Creek [illegible] one of [illegible] We [illegible] watched [illegible] saw the [illegible] the tempting [illegible] Sam produced broiled [illegible]

Sound Advice Blithely Ignored

Bob [illegible] ground [illegible]

Where Rest at Alum Cave Bluffs, Halfway Point to the Top of Mount Le Conte

Many a [illegible] has been spread beneath this overhang, a popular place for photographing [illegible]



Great Smoky Mountains National Park Straddles the Crest of the Appalachians

Congress authorized the park in 1926; Ten[illegible] relief. [illegible] State parks. Now [illegible] forest. This playground lies within easy reach of [illegible]

This sound advice we all ignored. Liz and Ruby, bird and flower books in hand, escaped around the bend of an inviting path, while the rest of us sat lazily around listening to a near-by tumbling stream. After dinner we kept warm by a roaring fire, singing ballads and telling stories.

Then, by flashlight, Gen and I struggled to blow up our air mattresses, find our sleeping [illegible] duffel bags for [illegible] couldn't find her [illegible] Florida cruiser who'll sleep [illegible] We passed our bedding close to the fire and tried to sleep.

But sleep [illegible] less and come easily to one used to four walls and a ceiling. Now our [illegible] tulip trees, [illegible]

We watched a gypsying mist envelop a narrow trail near by and listened to unfamiliar night sounds—the splash of a stream over rocks, whinnying of our horses, and unexpected crackles of the dying campfire.

"About bears" Gen whispered. No one had mentioned bears. "I was in a campground once, and we always kept tin plates by our sides to bang together. Scares them off and wakes up everybody to help."

Fine idea, we agreed; so we tiptoed among the sleepers to the "kitchen." With tin plates by our sides, we finally went to sleep.

The next morning, not far from camp, we came upon a one-story wooden building. Tom said, "That's Cataloochee School, the only active school in the park." We stopped for a visit (page 501).

Mildred Heal, who teaches first, second, fourth, and fifth grades in one room, invited us in. The children, seven healthy, happy youngsters, were shy, but pleased at this invasion of their schoolyard.

We admired their old-fashioned double desks and their crayon drawings above the blackboard. A potbelled stove in a corner provides heat. A second room in the back, with no panes in the windows, served as a recreation room on unpleasant days.

Black Bears by Hundreds

On the trail [illegible] markings—their droppings, logs clawed for grubs, [illegible] hundreds of black bears, protected in the park from hunters, range over the Smokies. Critical months for these animals are just before they hibernate, about Christmas. Then they must put on fat to last through the winter.

Many animals and birds, among them deer and wild turkey, have become scarce in the Smokies since the chestnut blight deprived them of a chief source of food.

From Trail Ridge, a climb of 1,500 feet in four miles, we could look across to Spruce Mountain. The patches of color on the mountainside, Tom told us, were laurel thickets. These almost impassable jungles, where bears like to live, are known to the mountain people as "woolly heads," "yellow patches," or "slicks."

The vastness was overwhelming. The Great Smoky Mountains National Park embraces 508,440 acres of forests, with 200,000 acres of virgin timber. In a few hours' climb horses carry their riders through sweet gums, umbrella magnolias, and shortleaf pines, common in our southern coastal States; then upward under maples, oaks, and hemlocks familiar in more northerly States, and finally into the stands of red spruce, fir, and mountain ash atop the highest peaks.

Temperature, sunlight, and shade often changed suddenly. Riding along the crest of Balsam Mountain, in the shadow of magnificent oaks, beech, and basswood, we kept on our jackets. But we hurriedly removed them when we emerged into the hot sunlight of Ledge Bald.

After lunch on a trail by a mountain stream we found a carved board which proclaimed "Round Bottom 2½ Mi."

"The liveliest sign in the mountains," Tom said. "It's a good four miles to camp." The sign was one of the more legible, however, for all over the park trail markers have been chewed and clawed by bears.

Round Bottom, former camp site of the Civilian Conservation Corps, lies on Straight Fork. Of the 653 miles of trails in the park, 90 percent were made between 1933 and 1942 by several hundred CCC boys. Some of these trails are four feet wide; others are merely suggestions that someone has passed through the forests. The Appalachian Trail crosses the park, following many of the highest ridges for 70 miles.*

It was raining when we halted, and Sam began cooking supper under an old shed; but Liz predicted the rain would stop—the jay she had heard meant clearing weather. The jay was right. The moon came out, and we went to sleep early, scorning the shed, home of numerous mouselike shrews.

Actually, one ran across my face during the night, and I never knew whether it got into my sleeping bag, because right then I established some kind of Smoky Mountain record for both sound and alacrity in emerging from that tightly zipped pouch.

When morning came, Ruby washed some clothes in the stream, hung them to dry, and struck out for a hike, for here we were to stop for another night. She took her nature walks at every opportunity, and they earned her the nickname "traipsin' woman."

A swim in the icy-cold water, followed by a walk, gave us a fine appetite for supper—fried chicken, rice, gravy, string beans, and hot corn bread.

The next morning we were awakened by Sam, who was removing the now dry underclothes Ruby had draped around yesterday's fire. "Ain't never seen nothin' like this in these woods," he said to no one in particular. "Now, was they *boomers* I'd know what to do with them."

Boomers Go Faster than Lightning!

"What's boomers?" we asked, and Glenn answered for him. "A boomer is the fastest little varmint in the mountains, kind of a red squirrel. Hit goes so fast that if lightnin' strikes the top of a tree what a boomer is, the boomer can beat it down to the ground, look back up, and say 'Hit's split!'"

He was right about their speed. Boomers were all over the mountains, and Tom, Glenn, and Sam saw them frequently, but I saw only where they had been.

I did see red crossbills, though. A flock of them flew in to take possession of our camp at Round Bottom before the pack horses were loaded. Sam told us that, because they used to swarm around and feed on salt licks provided for cattle, the mountain people call them "salt birds."

Our next overnight stop was to be at Pecks Corner. "If you forget anything, you can probably get it there tonight," Tom reassured us. "Nice little country store."

During the morning's ride we passed through a low gap to Raven Fork of the Oconaluftee.

A Taste of the Wilderness

"Over to your right," Tom said, as we forded Raven Fork stream, "is the most beautiful part of the Smokies. It's the real wilderness area of the park. Trails that used to lead in there have been closed off for 15 or 20 years and no horses are allowed. People can go in, of course, if they can get in" (page [illegible]).

The hardwood trees of Hughes Ridge gave way suddenly, about a mile from the camp site at Hughes Ridge Shelter, near Pecks Corner, to dense spruce and balsam, with a forest carpeting of moss, fern, and thick oxalis, or sheep sorrel. At a higher elevation hobblebush grew under the spruce and pine.

Pecks Corner, 5,700 feet high on the Appalachian Trail, proved to be miles from any roads or country stores. The joke was on us women, because we had cleaned up especially for a momentary brush with civilization.

The water at Pecks Corner contains sap from balsams and is sometimes harmful to horses; but it is fine for bears, I was told. One came to our camp that night—a friendly black cub, begging for food (page 463).

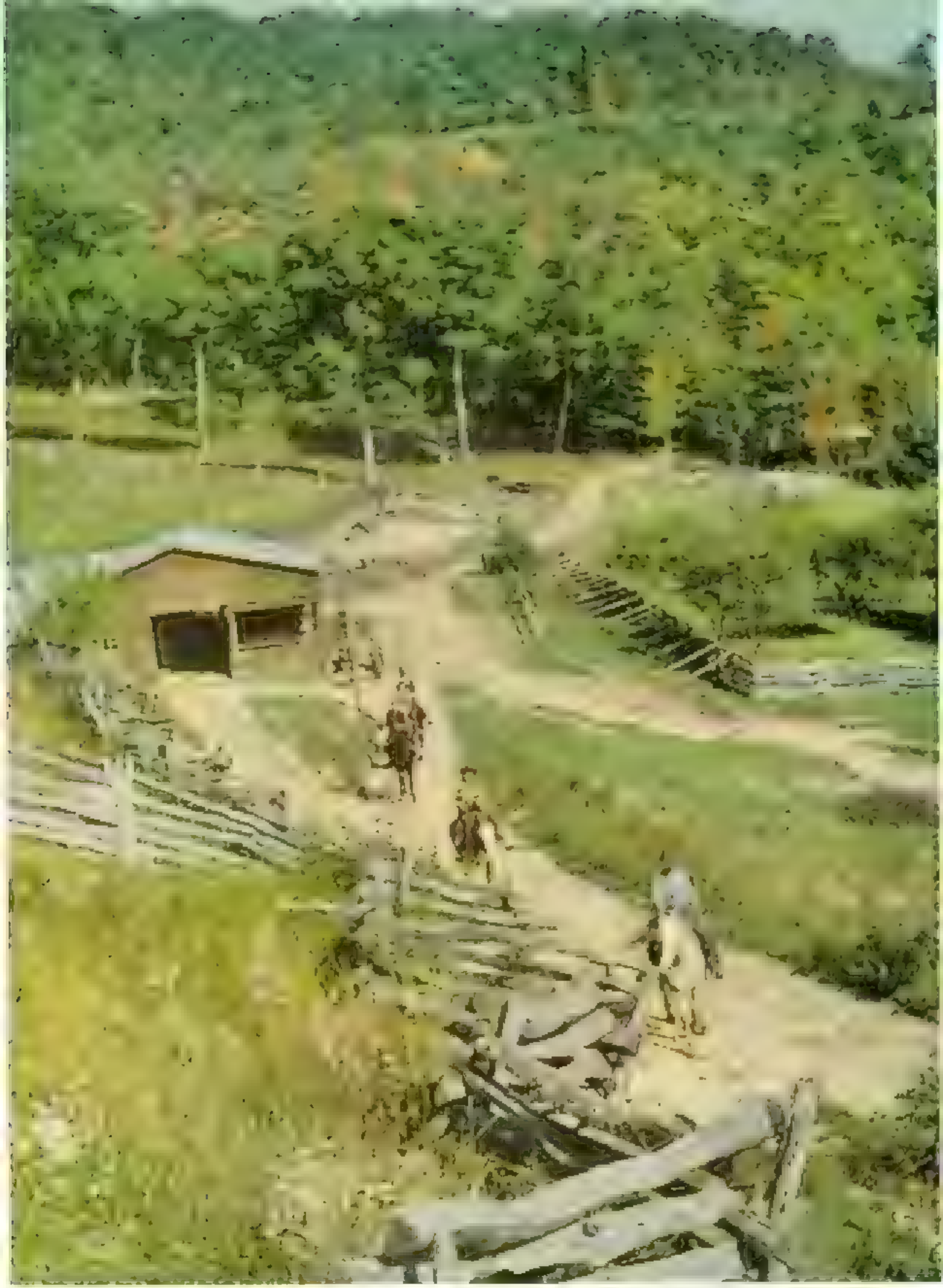
Later our flashlights picked up the dark outline of two grown bears making their way up a path from the spring. That night we were careful to have tin pans within easy reaching distance.

Mount Le Conte, with its promise of spectacular views of sunset and sunrise, was our next destination. Since we would stay that night at Le Conte Lodge, Sam and Glenn remained at Pecks Corner to "take care of the bears and pack horses."

From Pecks Corner our trail led once more into a spruce and balsam forest called Paul Bunyan's Toothpicks. For me these quiet, high, dark forests with their soft, mossy, unclattered floors are the most beautiful in the Smokies. Under the spell of their shadows the ancient Cherokee belief in "Little People," their *Yunwi Tunsdi*, seems credible.

These kindly, pretty, child-sized people, with hair falling below their knees, lived near the tops of the highest mountains, the Cherokees thought. They passed most of their time dancing and beating tiny drums. Sometimes they worked at night for proud

* See "Skyline Trail from Maine to Georgia," by Andrew H. Brown, NATIONAL GEOGRAPHIC MAGAZINE, August, [illegible].



Trail Riders Start a 16-day Adventure in Great Smoky Mountains National Park

Lures Expand, Sports Scan on Top of the World

[illegible]

[illegible]

[illegible]

[illegible]

Clouds Banked Like Snow Seem to Offer a [illegible] Bridge from Mount Le Conte to Clingmans Dome

[illegible]

A Naturalist Recaps the Park's Wonders By Canopus's Light

[illegible]

Fording Raven Fork, Footsore
Soon Got Snakes in the Knees

[illegible]

Lazy Hikers Have to Leave
Three Forks Fire's Campfire

[illegible]

people; and always they led lost Indian children home.

We had been warned about the Sawteeth, but the ammunition was unnecessary. Tom had already pointed out that the Appalachian Trail traverses the sharp mountain crests, whose drop off on both sides is thousands of feet.

No one talked much on this ride; we were busy holding reins and watching our horses' footing. Sometimes the way led up almost perpendicular sides; sometimes it wound among the rocky teeth. This part of the trail weaves between two States and sometimes marks the dividing line between Tennessee and North Carolina.

Still on the Appalachian Trail, we passed Dry Sluice Gap and led up our horses for a climb to Charlies Bunion. This peak, a mass of solid rock, is startling in contrast with the heavy forests and dense growth all around it. Many years ago a fire stripped it of vegetation, and the soil washed away (page 481).

The trail from Charlies Bunion is deceptive. In places it is a high ledge where trees and underbrush hide steep drops of 1,500 feet from unobservant riders or hikers. At one such point Gen's pack dropped from her saddle. She dismounted, as any of us would have done, to pick it up. One look at Tom's intense face alerted us to the danger. But her horse stood quietly, she remounted safely, and our string passed the ledge. "I just didn't want to have to go back and have Tom think I'm a sissy," Gen said later.

The Boulevard; Watch for Traffic

A little later Tom told us we were approaching the Boulevard. He advised us to stay well off the roadside because the horses, unused to fast-moving motor traffic, might become frightened. Perks Corner should have prepared us, for the Boulevard sign, where we left the Appalachian Trail at Mount Kephart, turned out to be only another bear-clawed marker pointing a narrow trail to Mount Le Conte nearly five miles away.

Heavy fog closed in on the Boulevard. We rode along in silence through dense clouds, scarcely able to see the switching tail of the horse ahead or the face of the rider just behind us. The steep, winding trail became a narrow rocky ledge, shot from the side of Myrtle Point, Le Conte's eastern overlook.

With the exciting feeling of being momentarily suspended in space, I called back jokingly to Liz, "What does the Sawteeth have that this lacks?" Liz, holding tightly to the reins, tense, alert, leaning slightly toward the wall and ready to jump, was in full control of her horse. Only a foolish beginner would have turned to look back on that ledge, I quickly realized.

"Camp" for the night was Jack Huff's lodge near the top of Le Conte, its cabins inviting with comfortable beds and roaring fires, its manicured lawn warm in unexpected sunshine. With sudden enthusiasm to watch the sunset, we climbed to Cliff Top, 6,343 feet above sea level, Le Conte's other vantage point. To our left a white churning sea of wind-charged clouds hid the valley; the bright red of the sunset flamed on the clouds over Clingmans Dome, purple in the distance, and threw a delicate glow to the dark green of Sugarland Mountain (page 484).

A Hurricane Leaves Its Mark

After a good night's sleep and a breakfast that would have done credit to Little Black Sambo, we said good-bye to our pleasant hosts at Le Conte and started down the Boulevard in bright morning sunshine. Sam and Gwen welcomed us back to Perks Corner and told us that a trail crew had been by, clearing away damage caused by a hurricane several weeks before.

The next morning, riding over the crest of the Smokies on the Appalachian Trail, we passed the worst of the hurricane damage at Mount Chapman and between Mount Guyot and Old Black. The hurricane, rare in the Smokies, had ripped through Florida, followed the State line between Alabama and Georgia, then reversed itself, so that the tag end had hit the Smokies from western slopes.

Where it had struck, destruction was complete. Huge trees, stripped of bark, were strewn about the mountainsides. Other trees without room to fall, leaned against each other. Forest undergrowth, accustomed to shadow was startlingly exposed in the bright, open sunlight.

Nature, having shown her ruthlessness, demonstrated her prodigality in the high balsam forests of Mount Guyot. Growing among fern and moss were hundreds of young balsams, fighting for sunlight and survival. Frequently birch and spruce with an affinity for each other grew together, their branches forming twisted patterns across the trail.

We stopped for lunch along the "old burns" (fire-scorched land) of the Big Creek watershed where red fire cherries, rose-purple huckleberry bushes, and yellow birch trees flashed their fall colors. Just before Cosby Knob the pack train pulled ahead of us and there we left the Appalachian Trail and turned toward Yellow Creek and a two-nights camp at Walnut Bottom.

Purple ironweed, foamflower, lady's-tresses, and blue lobelia grew around this pleasant camp, as well as the more familiar goldenrod

Mountain Orchestra Warms Up for a Square Dance at Cataloochee Ranch

[illegible]

and asters. But flowers which had bloomed earlier and were now in the "fruit" or berry stage were my favorites.

Barred Owl Joins Campfire Chatter

Arthur Stupka, the park naturalist, Ralph K. Sarver, ranger and [illegible] naturalist, joined us for supper on our last night at Walnut Bottom (page 455). Into our campfire conversation broke the hooting of an owl. Mr. Stupka identified the bird as a barred owl. The horned owl usually is found only at lower altitudes.

In the valleys and at lower elevations live wood thrushes, Carolina wrens, and towhees; among the hardwoods of the middle zones, ruffed grouse, hawks, and owls; and at the top, among the spruce, [illegible] and [illegible], [illegible], and [illegible].

Every year during Christmas week the park makes a census of winter birds. On a one-day count, 56 kinds were identified. More than 200 species of birds live in the mountains of the Great Smokies.

On the morning we broke camp at [illegible] along Swallow Fork, and in the early afternoon reached our last camping ground on the top of Mount Sterling. Heavy fog obscured an exceptional view from the fire tower [illegible]. We threw our sleeping bags on [illegible], and wandered through the "smoke" [illegible] blueberries and [illegible].

On our last day's ride we dropped down at Rough Fork of the Cataloochee [illegible] camping ground [illegible] trail which had been [illegible] and [illegible]. We entered a wild virgin forest and rode in the shadows of giant [illegible], tulip poplars, white oaks, hemlocks, buckeyes, sugar and red maples. Bear markings were everywhere [illegible]. Glenn claimed he could smell bears.

Tom Alexander Plunges into Raven Fork; Ruby Bete Follows Gingerly

[illegible]

"Mountain boys leave here," Tom said, "and go to work in factories in Baltimore, Philadelphia, and Wilmington, or in the lumber camps out West. But almost always they come back [illegible] couldn't [illegible] be water." We could understand how anyone who had grown up in these [illegible] would find it [illegible] sinking roots in other ground.

Few Park Visitors Forsake Highways

Last year [illegible] people visited the park. Of these only a few thousand left the paved roads to go into the woods. "They mostly were on [illegible] hikes or short [illegible]. More [illegible] percent of the people who come here see only 5 percent of the park," Tom estimated.

We were welcomed back to the ranch with an old-fashioned Sunday [illegible] square dance. [illegible] of the Mountain [illegible] people from Waynesville and [illegible] people from the [illegible], had come [illegible] between [illegible] moun-tain fiddler, sang for us his own charming song ballads. The [illegible] presented a [illegible] farewell to Ruby, Gen, and Liz, who were leaving early in the morning [illegible].

My curiosity about the chief wilderness area and desire to see it [illegible] at Cataloochee Ranch. Bob [illegible] stayed over, for Tom had promised that within three days he would take us in. [illegible] weather reports [illegible] storm would have forced [illegible]. Meanwhile, there was Cherokee [illegible] to enjoy—the Cherokee Indian fair.

The fair, well [illegible] exhibits of farm [illegible], home sewing, canning, and farm produce, was like a country fair elsewhere in the United States but with an Indian accent. It is held annually on the grounds of the Cherokee Indian Reservation, at the southeastern edge of the national park.

Today only [illegible] Indians who form the Eastern Band of the Cherokee Nation remain

to preserve as a distinct national unit their once powerful race. They are the descendants of those Cherokees who in 1838-39 fled deep into the Smoky Mountains to escape the forced westward removal known now as the Trail of Tears.*

Red Indian potatoes, strawberry [illegible], and [illegible], and the largest pumpkins and snap beans I have ever seen vied for attention among the agricultural exhibits. Some of the beans were dried and strung together in the old mountain custom to make "leather britches" (page 493).

Hand-carved wooden figures of farm and wild animals, and baskets woven of white-oak splints and honeysuckle dominated the arts and crafts displays. Some Indian women showed how these baskets are made; others worked at their looms and spinning wheels, or fashioned bright beaded bracelets.

At the singing contests I was intrigued by alternately loud and soft chanting in the ancient Cherokee tongue and by unexpected minor notes. Faces and lips of the singers were strangely motionless, for in singing as in speaking Cherokee, the lips never close.

We watched young Indian boys perform their Eagle Dance (page 495), and brightly dressed elderly men and women chant and dance their ancient Quail Dance. Then, in startling contrast, we saw a violent game of Indian ball.

Hard-boiled Arrowheads!

Ameneta Sequoyah, who finished second in the archery contest, let us examine his bow and arrow. When the wooden arrow point has been boiled a half hour, he explained, it becomes hard enough for hunting. His bow and arrow still bring down quail.

Seventy-year-old Jim Catolster, who hunted with a blowgun as a boy, demonstrated that he has not forgotten this ancient art. Antedating the bow and arrow, the blowgun is made of a stalk of river cane, the joints smoothed and hollowed. The locust-wood dart, forcefully blown through the gun, is feathered with thistledown (page 494).

Vegetables and fruits are major crops of the modern Cherokee, and since World War II tobacco also has been a cash crop. But Joe Jennings, reservation superintendent for seven years, told us of another source of income, called "chieftng." Indians who "chief" stand in front of the numerous handicraft and souvenir shops by the roadside and provide local color for tourists.

"We lost one of our best Sunday School superintendents all last summer because he started 'chieftng,'" Mrs. Jennings remarked. "Sunday is one of our best tourist days."

Back at the ranch we planned our trip into the wilderness area. Tom, Glenn, Bob Sevson, John Bradley, a forester from Birmingham, Alabama, and I would go by car to Round Bottom. Pack horses, brought by truck to that point, would carry our food and equipment up the mountain toward Breakneck Ridge, our jumping-off place.

"The Forest Primeval"—25,000 Acres

At Walnut Bottom Mr. Stupka had told us something of the wilderness. In the national park there are 22 major watersheds, equally divided between Tennessee and North Carolina. One of the more inaccessible watersheds is the Raven Fork area. Some 25,000 acres here were selected to remain forever free of any development. About 15 years ago the trails were allowed to grow over and even horses were barred.

"It is not a closed area," Mr. Stupka had said. "But because of its isolation and the fact that no roads come close to it, the impact of numbers of people will be eliminated.

"In the years to come, American people, [illegible] will have the experience of seeing original wilderness conditions. We hope people can say five hundred or a thousand years from now, 'There have been changes, but not here.'"

Extra shoes, jeans, and shirts, carried in duffel bags on the pack trip, were left behind for our walking expedition into the wilderness area of the Smokies. We took with us only essential personal items—a sleeping bag, minus air mattress, and a small back pack with comb, toothbrush, handkerchief, jackknife, flashlight, and a change of socks. To the amusement of my companions, I also found room for a lipstick and a compact.

From Round Bottom up the slope of Hyatt Ridge and nearly to the top, a climb of about 2,000 feet, one of the pack horses carried all our food and packs, and the other carried me. Tom insisted on this, and while I felt rather overly protected, since everyone else was walking, I appreciated his decision later.

As we climbed, we passed through groves of beeches and up into the northern hardwood belt. The song of a pine warbler heard

* See "Indians of the Southeastern United States," by Matthew W. Stirling, National Geographic Magazine, January, 1943.

[illegible]

Spring's Rhododendron Blossoms Overhang Mountain Trails →

A 15-foot hedge arbor shelters these girls on Alum Cave Trail, hike out to the summit of Mount LeConte

Transcendental Hikers Day Chased a Flower of Mountain Laurel

[illegible]

Laurel Brightens the Trail Home

[illegible]

Indians Demonstrate Skill with Blowguns at Cherokee Reservation's Fair

[illegible]

As Girls Beat Drums, Schoolboys Perform the Eagle Dance on the Mountainside Theater at Cherokee

[illegible]

^ Wilderness Hikers Test the Temperature of Three Forks Pool

[illegible]

< Racers Return to a Square Dance

[illegible]

Laurel Crop and Rhododendron Bloom to Produce Production. Nature In Their Gardens

through the trees blended harmoniously with the clump-clump of horses' hoofs.

A steep climb through spruce and birch took us to Hyatt Bald, now overgrown with young oak, birch, maple, and briers. No one has ever been able to explain to the satisfaction of everyone the origin of the balds in the Great Smoky Mountains. With spruce and hardwood all around, these balds, bare of trees and covered with a heathlike growth, dominate from 4,000 feet or higher the tops of numerous peaks (page 430).

Why Are So Many Smokies Bald?

Some scientists say that excessive evaporation, caused by winds and altitude, killed the trees on the balds. Others maintain that Indians cleared the mountaintops so well for lookouts and camp sites that tree seedlings have not yet regained a hold.

The Cherokees themselves believed that their ancestors cleared the tops as lookouts for a monster which was carrying away their children. According to legend, the Great Spirit sent thunder and lightning against the marauder, and afterward the mountaintops remained forever bald.

Tom is convinced, and most mountain men agree with him, that the balds were caused by man—perhaps cleared by white men or Indians as a grazing ground for cattle. He also thinks the balds will grow back into forests as man-made uses of them disappear. Hyatt Bald, once a treeless heath but now surrendering to wilderness growth, strongly supports his argument, as do Ledge Bald and Mount Sterling.

Where the maintained trail ended on Hyatt Ridge we said good-bye to the horses and to Glenn's nephew, who had come along to take them back to the ranch. After lunch at Mattie Springs we loaded our equipment on our backs and struck off on foot. Again I was given preferential treatment, since I packed only my own equipment.

Breakneck Ridge is aptly named. I had hiked many miles, but always in flat coastal country; climbing is quite a different matter. The trail, overgrown, but fairly well defined, led through a forest of spruce and birch, but not once in that struggle to the top did I think about its beauty.

My knees ached, and my breath came short. Still Tom, just ahead of me, kept on going. Because the wilderness trip was strenuous, he had been somewhat reluctant to take me along. Now, I thought, perhaps I had been foolhardy to attempt it. But as the only woman in the little group, I was determined not to be the first to cry "uncle." Then finally someone farther back suggested a rest stop. I sank down happily on the nearest log.

"What you need, Val, is a ramp," Tom said, dropping his pack to the ground.

"Ramp? What I need is a tunnel through this mountain," I replied, trying to catch my breath.

But Tom pulled up a white root and passed it around—the ramp he had referred to. "Stronger than garlic. Taste it," he urged. Only Bob had the courage to bite into that strong root; the rest of us scorned it in favor of chocolate bars.

Refreshed, we started again. We clambered over logs, pushed away briers, and edged around giant spruce trees. I learned to dig my toes deep into the ground when a strong foothold was necessary.

"Anybody want to stop and puff a while?" Tom called back as we reached the top. Everybody did. We dropped our sleeping bags and packs on the ground and used them as back rests.

Glenn seemed scarcely out of breath, but he, too, was glad to halt. I tried to lift his pack, but could hardly get it on the ground.

"First time I ever made a pack horse out of myself," he said, eying that bulging canvas bag. "Next time I load up them horses I'll know how they feel. 'Stead of cussing them out for not standing still, I'll feed them apples."

The descent of Breakneck Ridge, although hazardous, was easier for me than the short climb. We climbed over huge logs, or crawled under them when they were propped against the mountainside, and held tightly to trees to keep from slipping.

Traps among the Rocks

Tom warned us to stay clear of overgrown places on our right, where the mountain dropped sharply down.

"Years of growth are down there," he said. "You could fall in over your head in no time."

The growth was deceptive, for it looked fairly solid from above. "Underneath the duff," Tom went on, "are rock boulders with big holes in between. Filling the holes are more spruce duff, and branches, trunks, and roots of dead trees. It would be easy to break a leg."

Further out on the ridge we turned to the right. "What is the name of this trail?" someone asked. "Doesn't have a name," Tom replied. "Years ago I cut this through myself when we had a camp at Three Forks."

Immediately we named it "Tom's Trail." It, too, was merely a suggestion of the way down. Rhododendron jungles had engulfed it in places, and through these we crawled and climbed. Growth was so thick that our packs would have been scraped away had they not been securely strapped on.

An Unexpected Recess Delights Children of the Cataloochee School

[illegible] [illegible]

We came suddenly into a small clearing on the narrow path. "A couple of bears met here and [illegible] [illegible] [illegible] [illegible] [illegible]," [illegible] [illegible]. Freshly torn-up [illegible] showed they had been [illegible] while we [illegible] [illegible] [illegible] [illegible] of the mountain.

At the end of [illegible] Trail was Raven Fork. We [illegible] [illegible] [illegible] [illegible] [illegible], and came to our camping ground.

This was the most beautiful place in the [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible]. Here the waters of three rushing streams come together at a spot called Three Forks, [illegible] [illegible] [illegible] [illegible]. Spruce trees, large hemlocks [illegible] [illegible] [illegible] [illegible] [illegible] along the edges and [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] the [illegible] [illegible] (page 39).

We jumped from rock to rock as far as we could [illegible] [illegible] the stream. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] of his [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] chattered his complaints and [illegible] [illegible] into the woods [illegible] [illegible] [illegible] [illegible] to see his [illegible] [illegible].

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] through the Smokies. We had seen many of them but none [illegible] [illegible] [illegible] Raven Fork [illegible] [illegible] [illegible] this [illegible] [illegible] spot.

[illegible] [illegible] [illegible] camp [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. After [illegible] [illegible] [illegible] [illegible] [illegible] of [illegible] [illegible] appetite. [illegible] sleeping bag [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] around us and [illegible] with [illegible] [illegible] of animals. Bob saw the [illegible] of two [illegible]

Bedtime under Tarpaulins, Riders Wind Watches, Inflate Mattresses, Unpack Beds

[illegible]

way through the dark—an adventure much of one.

Rousing up [illegible] a couple [illegible] longings. We packed away the rest and cooking utensils, rolled up our sleeping bags and were ready to go. Then we sat around the fire talking for an hour, [illegible]

We were reluctant to leave Three Forks, but a long [illegible] found us. We started at the confluence of [illegible] Fork, [illegible] jumping from rock to rock. [illegible] the water [illegible] John, knowing we would all be wet before long, waded right in.

Strangely enough, we did not [illegible] even [illegible] water [illegible] through [illegible]

In the late afternoon we started looking for a camping ground [illegible] the largest [illegible] stream. [illegible] small [illegible] toward the [illegible]

We [illegible] The night [illegible] We were [illegible] and slept soundly.

[illegible] in the morning we started off again, [illegible] downstream. [illegible]

Hundreds of Years Old, This Mountain Laurel Measures 82 Inches in Diameter

[illegible]

[illegible] Legar [illegible] lakes [illegible] and [illegible] so much. But we still had [illegible] about of us and this [illegible].

No Place for Slickers?

[illegible] we [illegible] a [illegible] necessary to avoid a drop [illegible] the stream.

[illegible] trees, their trunks and [illegible] interwoven, were [illegible] [illegible] this confusion [illegible] were [illegible] [illegible] such a deliberate obstacle course [illegible] we [illegible] it fairly easily, climbing first up, then down, then up again.

When we stopped to rest by the stream, Glenn was [illegible]. He looked at [illegible] and [illegible]

"[illegible] asked my opinion," he said, [illegible] to ask me, I'd say this is [illegible] for a woman. It's a place for [illegible] slickers. Especially [illegible]

[illegible] I [illegible] the [illegible] [illegible] I would the [illegible] would [illegible] [illegible] I would probably [illegible] [illegible]

But [illegible] are more accessible; and [illegible] and there is something about the water that [illegible] back.

Pennsylvania Dutch Folk Festival

Visitors by Thousands Flock to Kutztown, Pennsylvania, Each Year for a Sample of "Dutch" Culture and a Taste of Shoofly Pie

By Maynard Owen Williams

With Illustrations from Photographs by the Author

In southeastern Pennsylvania some of our Nation's fairest land rolls along from fruitful valley to pleasant hill. Here, generations ago, refugees from poverty and oppression in the Rhineland and Switzerland found a peaceful haven in a superlatively fine farming section.*

The Pennsylvania "Dutch" were honest, industrious, intelligent, and neat, and so they have remained. Loyal Americans, in love with our land and institutions, they say they were the first to call George Washington the "Father of His Country." Their familiar name, "Dutch," implies no connection with the Netherlands, but is a corruption of the German word *Deutsch*, meaning German.

On a sunny fourth of July I was driving through the Dutch country. From Reading I turned northeastward along U. S. Route 222 toward my destination, Kutztown.

Close-set shocks of golden grain were drying in the sun, while green expanses of waving corn rested the eye. Set in fat valleys, neat homes and bulky red barns suggested patient toil, prosperity, and idyllic peace. Lying in the shade, mild eyed cattle chewed their cuds. Lustrous-backed chickens crowded the feeding boxes or lifted their heads as they grazed.

Dutch Partial to Red

Bright-red tractors stood under long forebays decorated with geometric designs or simulated arches indicated by semicircles of white paint on the red walls. These "Dutch" descendants of German and Swiss ancestry like any color so long as it is red!

I could forgive the few signboards, since they pointed the way to good food, a Pennsylvania Dutch distinction. Here and there, as I passed through a village, a sharp-angled church, painted deep red over the darker bricks, lifted a narrow spire toward heaven.

About halfway between Allentown and Reading, Kutztown shoestrings its stores and restaurants along Route 222 (map, page 500). On each side neat homes set in velvet lawns soon give way to growing crops. On College Hill, at the west end of town, rise the ivy-draped buildings of Kutztown State Teachers College.

Hundreds of cars were going my way. At the town's principal intersection many of us turned to our left and after a few blocks drove into the grounds of the Kutztown Fair Association, already thronged with visitors. For this was our objective—the annual Pennsylvania Dutch Folk Festival.

More than 50,000 persons from 36 States came to see this fourday revival of "Dutch" culture, folklore, and tradition, and to partake of genuine Pennsylvania Dutch cooking. Busloads came daily from New York City. Some visitors came from the Canal Zone, Cuba, Hawaii, Switzerland, and England.

Dress Identifies "Plain People"

But [illegible] the fun loving Pennsylvania Dutch themselves. They came principally from the counties of Berks, Lebanon, Lancaster, York, Adams, and Dauphin.

To the eye, the vast majority of this well-fed, well-dressed throng was no whit different from any other American gathering. The preponderance of Pennsylvania Dutch are loosely grouped as "Church People"—Lutheran, Reformed, United Brethren, Evangelical, and the Moravians. Their daily customs and habits are those of their fellow countrymen anywhere in this broad Nation.

In the throng, however, was a sprinkling of those picturesque Pennsylvania Dutch known generally as the "Plain People"—Mennonites, Amish, Dunkards, or Brethren and River Brethren—distinguishable by their dress. These thrifty, mostly agricultural folk have clung to their old religious beliefs and precepts through the years.

Mennonite men wear low, broad-brimmed hats and coats with stand-up collars and no lapels. The women don small, neat black bonnets, with prayer caps of fine white linen beneath, and dresses with tight bodices, long, tight sleeves, and high necks.

Unlike the Mennonites, the Amish wear brilliant colors—bright violet, rich wine-red or vivid green. The men's shirts nearly always are of one of these bright hues, but their suits are black, without lapels or outside pockets. Their black hats have broad brims and low crowns. Hooks and eyes, and even

* See "In the Pennsylvania Dutch Country," by Elmer L. Stauffer, NATIONAL GEOGRAPHIC MAGAZINE, July, 1941.

Pennsylvania Dutch Neighbors Plan Spaghetti-plate in a Barn near Allentown

[illegible]

[illegible]

Schmitz on Knepp's Hearty Fare

[illegible]

[illegible]

“When [illegible] anything [illegible] [illegible], [illegible] wish and the wish will come true,” I read. I wished I knew the taste of blue balsam tea [illegible] a cup [illegible] at once.

In front [illegible] [illegible] card of undoubted truth: “Man and wife [illegible], but each has [illegible]h.”

Nor did the next [illegible] restrain the wife's love of good food: “A fat [illegible] and a full barn never [illegible] any man [illegible].”

A third [illegible] warned against [illegible] [illegible] in so [illegible] [illegible] [illegible] [illegible] [illegible].

Before the festival was over, I had been fed by women of many faiths and culinary skills. But in the [illegible] the sunbonneted cooks of the Women's Guild [illegible] [illegible] Reformed Congregation [illegible] Women [illegible] Pennsylvania [illegible] [illegible]. I followed the [illegible] of [illegible].

A Kutztown Housewife Fries Funnel Cakes

[illegible]

He was Dr. [illegible] [illegible] “The Wanderer” [illegible] his [illegible] [illegible].

While I was taking his picture at table, it occurred to me that such a man knows [illegible] [illegible]. A half [illegible] [illegible] [illegible].

“Hex Signs” Debunked

Heart of the festival was the series of [illegible] [illegible] concerned with the preservation of Pennsylvania Dutch culture, tradition, and speech.

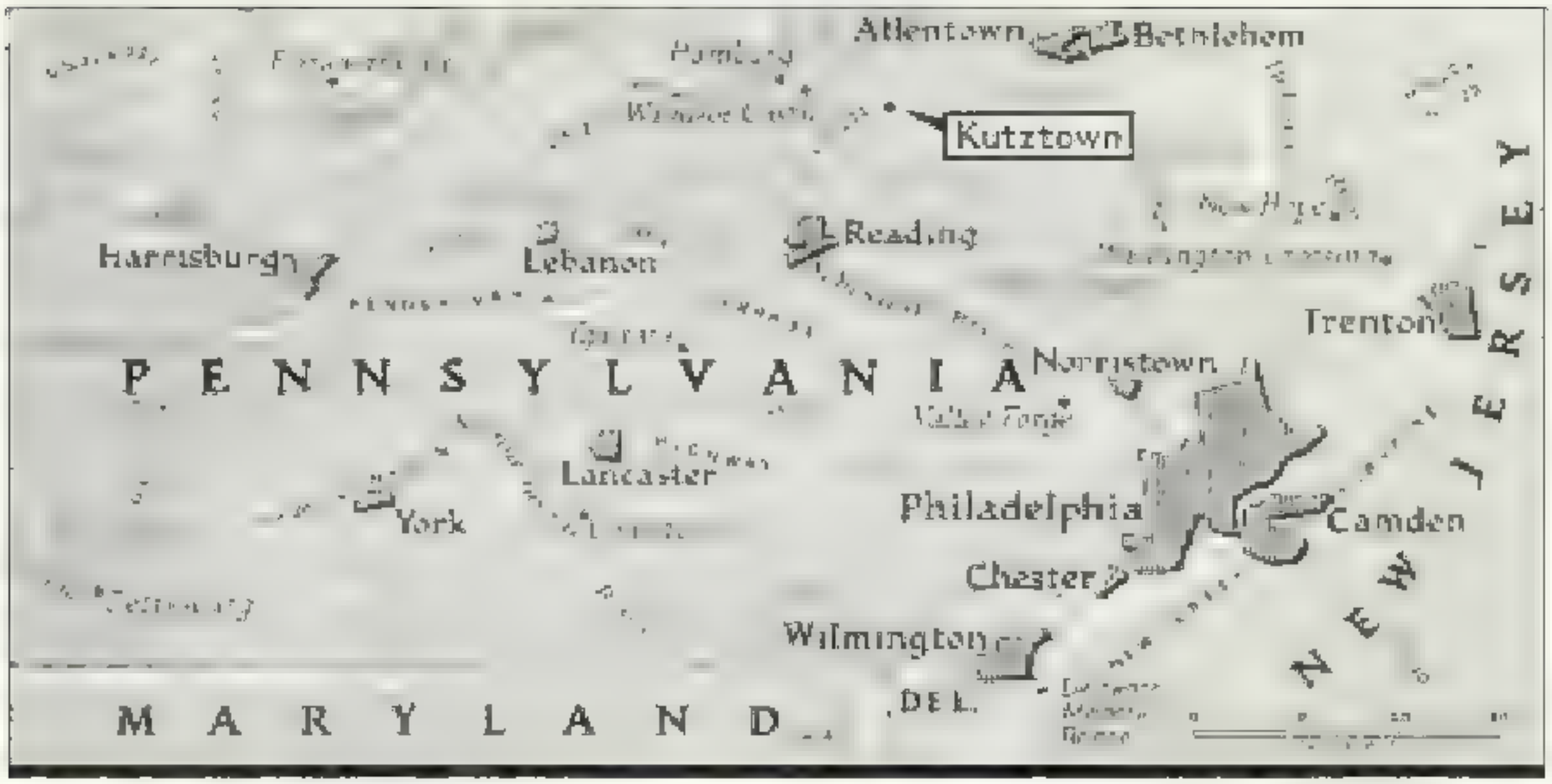
Here I heard Dr. Alfred L. Shoemaker, [illegible] of the Pennsylvania [illegible] [illegible] and one of the leading spirits of the festival, [illegible] three [illegible] “Dutch” myths.

“Hex signs” on barns, he pointed out, are not hex signs at all. A Pennsylvania Dutch housewife does not feel obligated to [illegible] [illegible] [illegible] on her dinner table; and an Amishman does not paint his gate blue to signify he has a marriageable daughter!

Dr. Shoemaker has found [illegible] [illegible] in German, Swiss, and [illegible] folk art, but believes them to be decorative motifs, nothing more. Many writers have seen [illegible] the [illegible] [illegible] [illegible] [illegible] of evil.

But the [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

The [illegible] when the [illegible] [illegible] Kutztown and does not [illegible] [illegible].



Here the Pennsylvania Dutch Have Lived and Prospered Since Colonial Times

[illegible] immigrants settled the area. Today it contains some of the Nation's finest farms. No specific boundaries, but traditions, cookery, and sometimes speech habits set them apart.

Why didn't the hex sign migrate westward with the Conestoga wagon? Dr. Shoemaker had an answer for that one. Because the Plain People—Amish, Mennonites, and Dunkards—imposed a barrier of custom.

But Dr. Shoemaker, scholarly in his search for truth, is tolerant of fable. Says he:

"No matter how well we may try to educate, people I am afraid will still go on saying 'hex signs' are symbols put up to ward off evil spirits . . . the myth is interesting, fascinating, and is exactly what the tourist wants to hear!

Dr. Shoemaker turned to the story of the seven sweets and seven sours. [illegible] eration, he said. Long ago a price was offered for their names, but it goes begging.

As for the blue gate: "There simply aren't that many gates," he said.

In Lancaster there is a lively sale of booklets on bundling, or courting in bed, in both the Old and New Worlds. A speaker questioned its prevalence among the Dutch.

Dr. Shoemaker asked one of his students the purpose of the wide plank which separated a couple as they snuggled under blankets, fully clothed, in a cold house.

"To keep everything above board," the student gravely replied.

Associated with Dr. Shoemaker in furthering the annual festival are Dr. Don Yoder and Dr. J. William Frey. All are members of the faculty of Franklin and Marshall College at Lancaster.

Dr. Frey is the troubadour of the movement. Wearing a hand-braided, weather-stained old hat, he sang folk songs to a rapt [illegible] listeners. The church groups also sang. For more than an hour I listened to and joined in the singing of Dunkard hymns and Amish show tunes.

Leader "Deacons" the Hymns

About a score of Dunkards occupied the platform while we sang "Dutch" words to old, familiar music. Many Dunkard congregations lacked hymnbooks, so the leader lined out the words. Since this task often fell to a deacon, the phrase "to deacon" the words came into use.

[illegible] Amish show tunes were sung by Joseph W. Yoder, who has published several of them. The Amish bar musical instruments but they produce the effect of a pipe organ with human voices. They also refuse to permit their hymns to be sung on the radio.

Mr. Yoder asserts that the Amish show tunes represent the earliest form of Christian singing and are related to the old Gregorian chants. Sometimes there are eight or ten notes for a single syllable, and to carry these from memory requires constant practice. Mr. Yoder fears that, if they are not soon set down, they may be lost forever.

Preservation of the Pennsylvania Dutch dialect is one of the preoccupations of the festival, and much of the attention to it takes the form of humor. Dr. Wannemacher is only one of a group of dialect entertainers.

Another, Paul Wieand, is best known under the name of "Sammy," for which rollicking character he uses a falsetto voice. With his

Bonneted Aunt Sophia Rubs Her Remedies for Warts and Other Ills

"Gotta Dime? Let's Ride the Ferris Wheel!"

Young Women Play a Game with Sticks and Tin Cans . . . A Blindfolded Driver Veers Off Course in the Wheelbarrow Contest

[illegible]

Adult and Learned Converse in "Dutch"

[illegible]

Decorative Menus List a Taste Treat

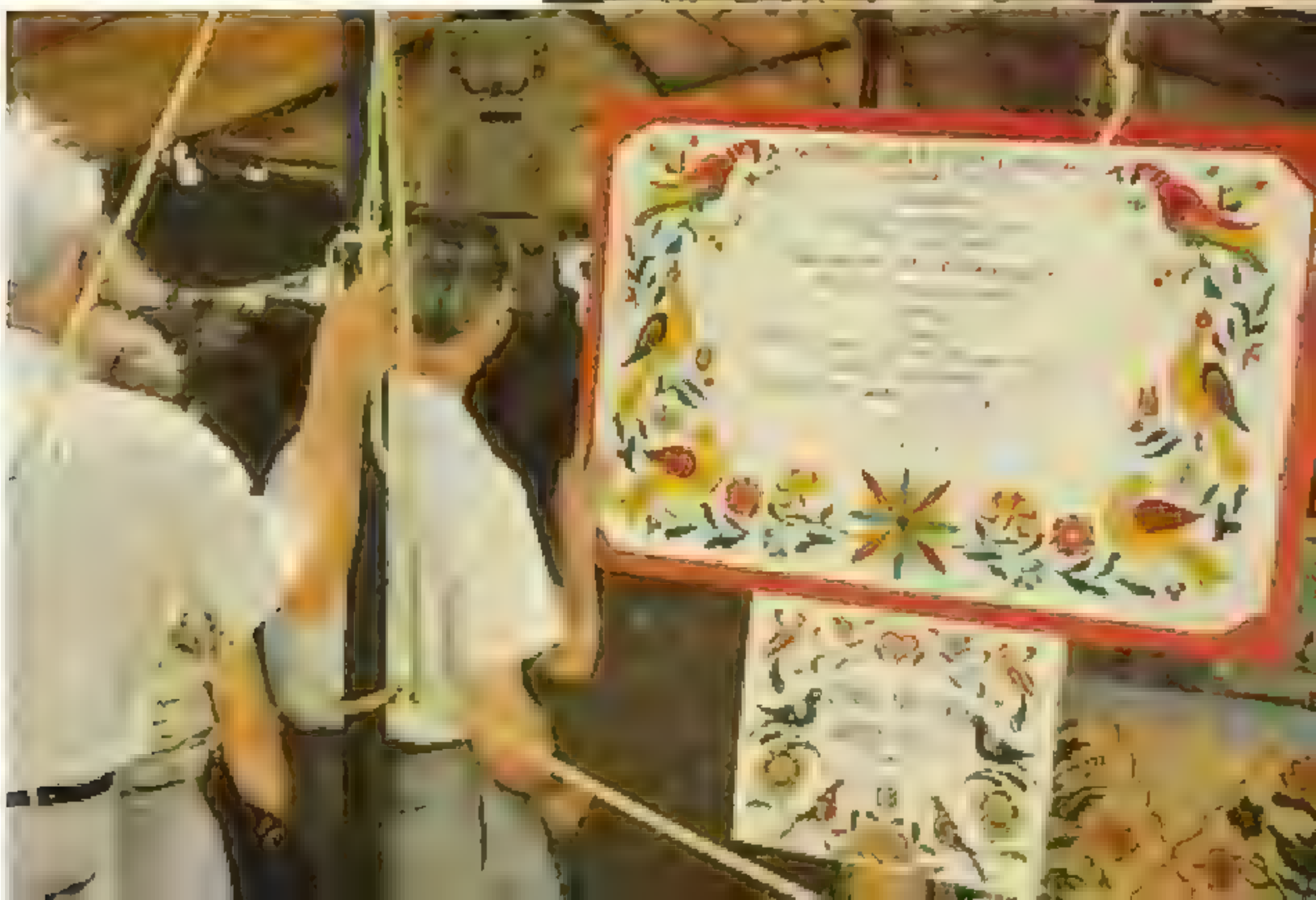
[illegible]

Bakers Roll and Cut Tasty Doughnuts

[illegible]

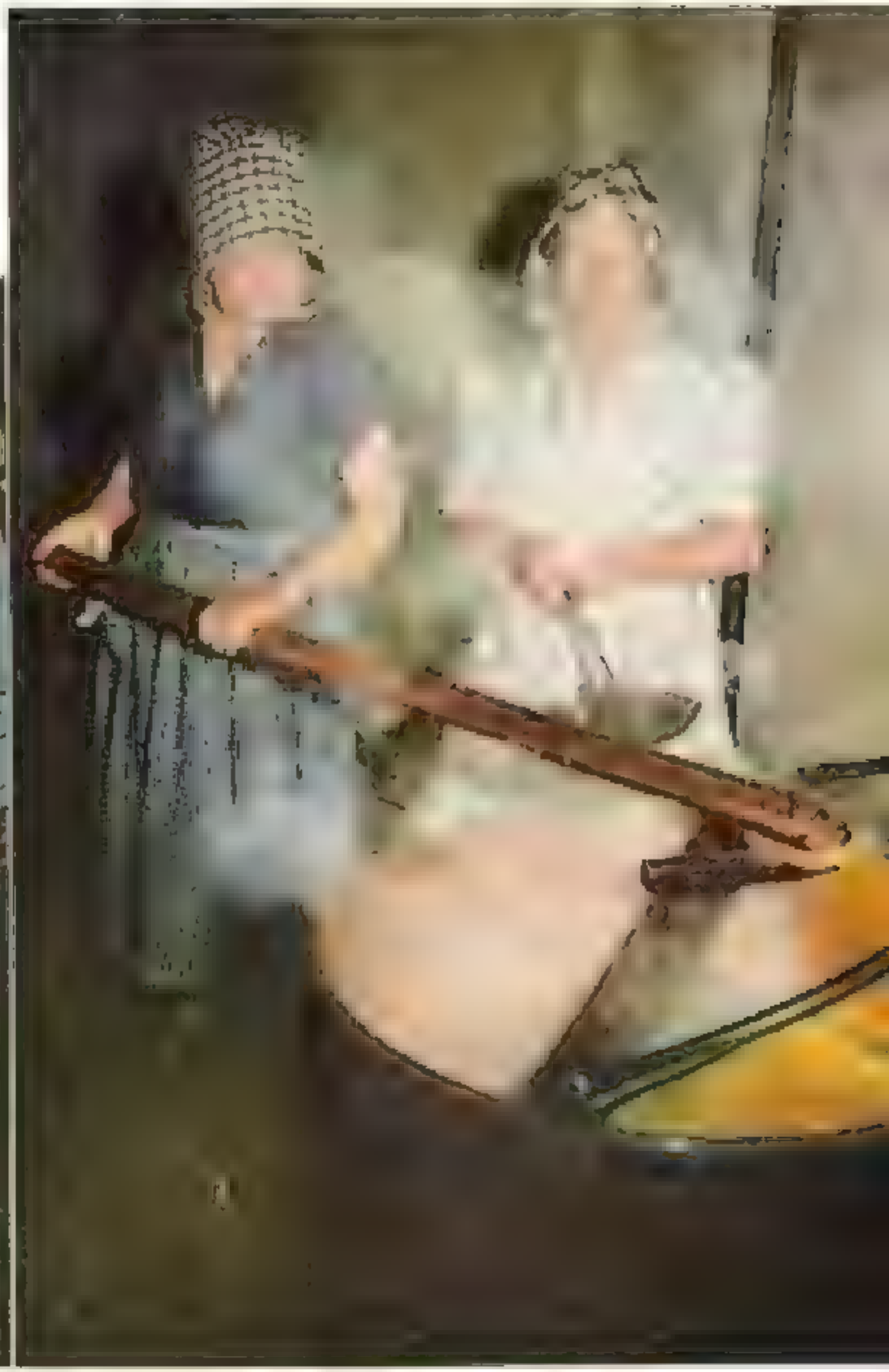
"Get 'Em While They're Hot!"

[illegible]



Churchwomen Show the Younger Generation How to Make a Patchwork Quilt

Pageant Napper Drifts from a Kettle of Boiling Apple Butter



"Oompah! Oompah!" Charles Tink Hits Bass Notes on the Tuba

[illegible]

"Call It What You Will, but It Looks Suspiciously Like Kissing!"

[illegible]

commonly "Der Assebee," in real life Dr. Harry Hess Reichard, a retired professor of German, he presented sidesplitting skits in shrill dialect. The pair also entertain in Pennsylvania Dutch on the radio, Dr. Reichard as "Assebee Mumbauer of Owl Valley," providing a droll philosophy (page 504).

Samuel Wissler, of Ephrata, a community which is an old stronghold of "Dutch" culture, presented a humorous skit in dialect, highlight of which was a description of the discovery of America by Columbus.

When Mr. Wissler donned his false whiskers, his low black hat, and tight-fitting suit, the willing audience was ready to laugh before he had uttered a word. But the comical aspects of his recital were balanced by the fact that he was keeping alive a dialect which is passing into disuse. Dr. Shoemaker estimates that about half a million people understand Pennsylvania Dutch today.

Incidentally, the dignified Dr. Shoemaker is known to his fellow "Dutchmen" as "Goat Beard."

The Allentown newspapers carry columns in Pennsylvania Dutch. One of the best known of these is by William S. Troxell, "Pumpernickle Bill" (as he spells it).

The crowds also enjoyed hearing the efforts of Pennsylvania Dutchmen to master the English language.

Old chestnuts such as "Did you bell? Sure I belled, but it didn't make," and "Bell don't nution. Bump," bobbed up. They are not difficult to understand. The first simply means, "Did you push the bell? Sure, but it didn't ring." The other: "Bell doesn't ring. Knock."

A trifle more difficult was the statement attributed to a little boy who was watching a train roll by. As it passed, he turned to his mother and said, "Ain't, Mom, when the little red house makes by, the train is all?" He meant: "Isn't it true, Mom, when the caboose goes by, then that's the end of the train?"

How to Call a Hog—or a Husband

Delightful was the cow-hog-chicken-cat-and-husband-calling contest.

"Wootsie, wootsie, wootsie," is the accepted form for hog calling, for example. But when the women participants were asked to call their husbands, there was a slight pause. Then one woman asked, "Do you mean when I'm mad at him, or just for so?"

Old games claimed a share of attention (pages 504, 512, and 514). Boys and girls played "Picking Cherries." One couple stood on chairs and another below. Each cherry, in the form of a kiss, was passed down from the girl in the tree to the boy below and from the boy in the tree to the girl below.

One tent sheltered a quilting party (page 512). Not many years ago nearly every churchwomen's guild in the Dutch country made patchwork quilts, but today the art of quilting is losing ground rapidly.

In another tent apple butter was being boiled in traditional style. Apple butter parties still are popular in a few localities and are all-day affairs.

After the apples are gathered, some are pressed into cider. The rest are pared and cut into small pieces, then put into the cider, which is boiling in a huge copper kettle over an outdoor fire.

To be good, apple butter must be boiled slowly and long, but constant stirring is required to keep it from sticking to the bottom of the kettle. Stirrers used large wooden paddles with long handles (page 513).

Favorite "Dutch" Bird, the Dinelfink

Hand-painted bells, flatiron stands, hand-made soap and candles, and hand-blocked stationery were on display, as well as needlework with Pennsylvania Dutch decorative motifs—the heart, the tulip, and that allegorical "Dutch" bird, the *distelfink* (page 511).

In one tent was one of the thousands of Conestoga wagons that once rolled over the first macadamized highway in the United States, from Philadelphia to Lancaster, then the State's largest inland town, and later hauled the possessions of the pioneers all the way to the Pacific coast. With slight modifications it became the prairie schooner.

Its body was built sway-backed so that, on hills, the loads would not slip out at the ends. Weighing as much as a modern automobile, the wagon was hauled by six Conestoga horses, one of which the driver rode, and took from three to four days for the 62-mile trip. The wagon was first built in the Conestoga Valley, in Lancaster County.

This wagon, according to legend, is the reason why American motorists drive to the right and why the steering wheel, which replaces the Conestoga driver, is on the left.

No real horseman would try to mount a trained horse from the right, and the best spot from which to guide a wagon when passing is on the near side. To mount the off horse from the left, a driver would have to walk the wagon tongue; so the right, or near, horse was ridden. Had the wagons passed on the left, a sextet of horses would have obscured the view.

Hence the wagoner mounted as a horseman would. He guided his horses to the right of any wagon he met. Today, motorists on the Lincoln Highway follow the habits, as well as part of the route, of America's first paved highway.

Many bits of our common speech date from

A Lehigh County Artist Letters a House Blessing for a Neighbor

[illegible] "Bless [illegible] Lord and Thy Master."

[illegible] the days of the conestoga and tumble Conestoga wagoners. When they met on a narrow road, the language was [illegible] hasn't taken [illegible] to be [illegible] with [illegible]

[illegible] through the [illegible] was [illegible] value [illegible] but in the [illegible] insist that [illegible] [illegible]

[illegible] had to accept [illegible] according to custom [illegible] to the research [illegible] that there has been [illegible] up.

How "Stages" Got Their Name

[illegible] drivers [illegible]

[illegible] Turnpike reaching [illegible] of cars follow [illegible] rate of 70 miles [illegible] travel from Philadelphia to Pittsburgh has been cut from [illegible]

[illegible] made without labor [illegible] machinery [illegible]

[illegible] Lancaster County.

[illegible] the [illegible] and [illegible] and [illegible] selection and enabled [illegible] home with a [illegible] wind instead of turning it right. The patch box in the lane-polished stock was [illegible] as well as utility.

[illegible] Lancaster [illegible] the [illegible] festival.

After four days, during which the normal population of Kutztown was increased [illegible] times, the last to leave jumped [illegible] [illegible] with [illegible] [illegible] card. Even [illegible] could not [illegible] a [illegible] festival in full [illegible]

Lost Kingdom in Indian Mexico

In the Ruins of Their Ancient Civilization the Tarascan Indians Hunt with Spears, Sleep on Coffins, and Capture Pirates

By Justin Locke

With Illustrations from Photographs by the Author

For the [illegible] tomary vehicle for a trip into the past is a time machine. For me it was an ancient, asthmatic bus throbbing in the market square of Patzcuaro, Mexico. If it held together long enough, it would, I hoped, take me into the land of the Tarascan Indians, whose golden empire and strange pagan gods ruled supreme here before the coming of the white man.

The journey, I quickly discovered, would not be a lonely one. From my perch on a gasoline can by the driver's seat I watched Tarascans clamber aboard to fill each seat and the aisle, too. Women in bright blouses clutched live chickens and bags bulging with everything from pottery and beans to bananas and carved spoons. The men carried big sacks of corn, which they slung along the floor and used as cushions.

Chocolate Cements a Friendship

One 4-year-old girl, finding no other unoccupied spot, solemnly ensconced herself on my lap.

The 10-mile ride to Erongaricuaro took an hour and a half. As we jounced along I proffered my small companion a piece of chocolate and made what I thought were interesting observations on the world around us. She ignored my commentary, but with a grateful smile spread the chocolate liberally about her face and blouse.

Eventually, the bus drew to a trembling halt on the shores of Lake (Lago de) Patzcuaro, and we disembarked (map, page 519).

Across the water stretched the islands of Janitzio, Yunuen, Tecuena, and Jaracuaro. To my right and left cultivated fields led down to the shore line (page 530). Behind me wooded foothills marked the beginning of the western Sierra, home of Paricutin.*

In 1943 this volcano rose like an evil genie from a peaceful cornfield. It has since entered a period of quiescence, but during my visit it was erupting noisily and earning the title some Mexicans have given it, "the Angry Goat of the Sierra." I meant to see it at close range, if I could. But I was in no haste; Tarascan Mexico lay all around me, and that was delightful enough for the present.

I rose at dawn the next day to visit Janitzio. Up Jaguat came with "Tata" (father) Pedro, a hardy 85-year-old fisherman. Our primitive, shallow-draft boat cut narrow channels through the thick aquatic grass. Haze veiled the shore line and its background of volcanic shapes. Neither Tata Pedro nor I uttered a sound. Only the beat of his round-bladed paddle broke the silence.

Suddenly Tata said: "Have you heard the story that the Americanos are draining the waters of the lake so as to reach the golden pillars that uphold Janitzio?"

Before I could answer, he laughed.

"To tell the truth, Senor, I cannot believe such things, but such is the story among many of the island people."

Tarascan Indians, I knew, are great believers of legendary tales passed on by older members of their communities. I had heard of the wooden cow of Cerro el Zirate, of the dreaded *nirangua*, malevolent spirit of the Sierra; and of buried treasure by the ton.

Tata Pedro pointed with his paddle. To the right a lonely boatman was hunting coots and ducks from his canoe. With scarcely a ripple, his boat slid toward a thousand tiny dots.

Slowly the boatman rose and threw his long spear, or *fisga*, in a high arc. With a flashing of wings the birds whirred into the air. But the hunter had made his kill.

To launch his fisga, he had used a spear thrower, or *atlatl*, which provides a catapult action. Tata Pedro assured me that this weapon, an earlier development than the bow, is effective up to 150 feet.

1,000 Boats Mass for Hunt

Almost every week during the migration season, he said, large hunts are organized by the lake fishermen. A mass of boats forms a large or circle around the ducks. Then the boats close in to shore. Outside the ring many canoes poise in strategic locations.

Suddenly, with much screaming and splashing of water to scare and confuse the ducks, the hunters of the first line lift hundreds of spears. The kill is under way. Birds that escape the onslaught of the inner group come

* For other articles on Mexico and Paricutin in the National Geographic Magazine, see "Mexico's Economic Capital," by Miguel Covarrubias, December, 1951; "Seven Mexicos in Our Backyard," by W. Webber, August, 1946; and "Paricutin, the Crater That Grew a Volcano," by James A. Green, February, 1944.

Gnarled and Ancient Olive Trees Shade Tarascans Visiting Tzintzuntzan

[illegible]

to rest. Beyond the first line [illegible] to find a second [illegible].

Biggest [illegible] of the year [illegible] October 31, when the [illegible] begins. This [illegible] precedes the *Día de Todos Santos*, All Saints' Day.*

After midnight the women and young girls of the island leave for Janitzio's cemetery. They bear baskets [illegible] lighted candles and [illegible] bread, [illegible] and other [illegible] which [illegible] place on the graves in impressive array.

After covering the [illegible] with flower [illegible] throughout the night. Kneeling [illegible] and whisper prayers, while the church bell tolls [illegible] a thousand [illegible].

On [illegible] Janitzio's [illegible] bells [illegible] in the [illegible] morning and evening, when the fishing fleet arrives and departs.

Fishing Boats Carved from Single Log

Between times, young boys and girls wind thread [illegible] and string it [illegible] great lengths [illegible] along the street. [illegible]

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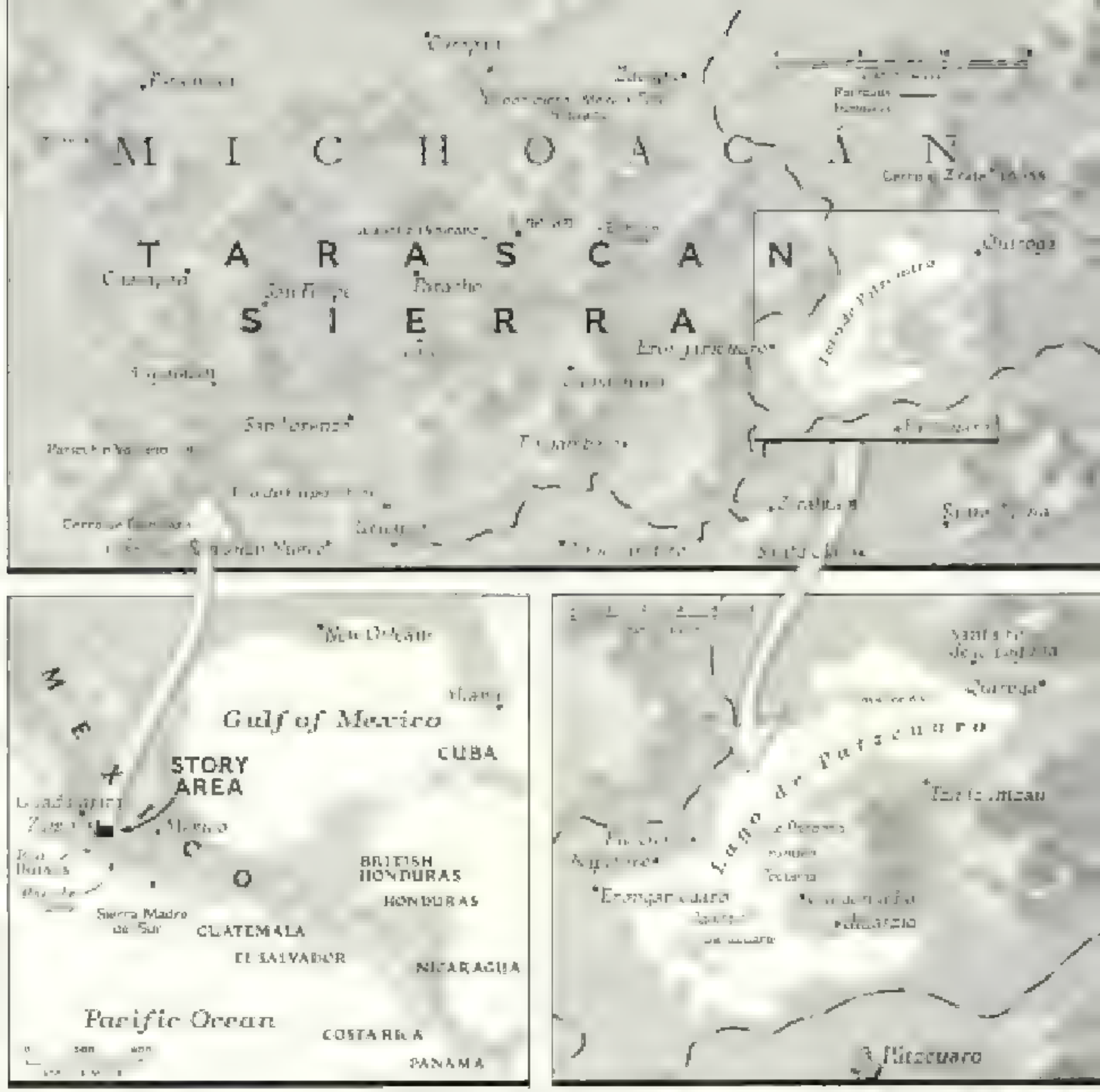
* See "Mexico [illegible]" [illegible] National Geographic Magazine, March [illegible].



Volcanoes and Lakes Shape the Lives of Mexico's Tarascan Indians

Paricutin (top, left), spewing millions of tons of lava and ash, has built a cone 1,500 feet above the original ground level. Born in 1943, it suddenly became quiet early in 1952, and neighbors were sorry when its very unusual display had ended. Many Tarascans live around Lake Pátzcuaro, seat of their pre-conquest empire; others dwell in the highlands.

and women mend the nets (page 525). As for the men, fishermen, they try to catch up on their sleep. Late afternoon calls them back to the lake in their large dugout canoes.

Cut from single pine logs, these craft are custom-made in the Sierra and brought to the lake by oxcart. In Cumichuén and Santa Juana their manufacture is a centuries-old craft. Manned from the prow by three oarsmen, the canoe is steered by a paddler at the stern, while other crewmen arrange nets.

On the day on which Tata Pedro and I approached the volcanic mound of Janitzio, most of the long boats had returned from making the early-morning catch. Already life seine nets were being hung for the day along the streets to dry (page 530).

Leaving Tata Pedro huddled over a cup of hot coffee, I started climbing the narrow streets of the village. Its tan adobe dwellings, pitched roofs of tile, and ample balconies were now caught by the sun's first light. At the island's wholesale store, Janitzenas waited their turn to sell their trays of fish.

I walked down a cobbled path under overhanging nets to the home of a fisherman, Salvador Fermin, whom I had met on a previous visit (page 523). Stopping before the open doorway, I called within.

In the dark recesses of a terra-cotta kitchen,

pottery hung symmetrically against a wall of red earth. A young girl flipped tortillas above an open fire. The glare brightened her dark eyes, flashed on her silver earrings, and tinted her sparkling yellow blouse. She wore a necklace of coral from the distant sea and a heavy wool skirt that extended to her bare feet.

"My father is hanging his nets with his crew, but my mother will soon be back from the store," she said shyly.

I sat by the door to wait. The room, I saw, contained a few *petates*, or sleeping mats, several nets, two water jugs, a chest of wood. In a far, dark corner stood the characteristic Tarascan home altar decorated with an array of religious figurines and pictures of saints.

Beside a vase containing faded paper flowers on the altar table stand two receptacles for copal incense. These, I knew, would be lit each day at sundown. It was a simple ritual, reminiscent of [illegible] the Tarascan Empire, when smoke from sacred bonfires was believed to provide direct contact with the gods.

Tarascan Warriors Fought the Aztecs

The Tarascans, I was well aware, had not always lived as humbly and obscurely as the Indians I was now visiting. The civilization they had founded along the shores of Lake Pátzcuaro in the 14th century had, in fact, rivaled that of the Aztecs. Displacing or assimilating earlier nomadic and farming tribes, they had built an empire whose might was felt throughout west-central Mexico.

Tarascan craftsmen turned out copper tools that were widely sought, mosaics of multicolored feathers, brilliant lacquer work, tools carved from stone or molded of *pasta de maíz*—the ground pith of cornstalks.

In the arts of war, too, the Tarascans could hold their own with any of their neighbors, the Aztecs included. When trouble threatened high priests in richly feathered capes would call the young men of the empire to arms. And the warriors themselves, their naked bodies tattooed and painted red and black, would sally forth behind their feathered banners, led by officers in jeweled vestments.

Strong and effective they were—until the day Hernando Cortéz set foot on Mexican soil. Then their chief, Zuangua, made his fateful blunder. Montezuma pleaded for a common front against the enemy. Fearful of Aztec trickery, Zuangua refused.

Cortéz, seizing the chance to "divide and conquer," left the Tarascans for later and fell upon the Aztecs. When they had been destroyed, he sent Cristóbal de Olid to take care of the Tarascans. In a matter of weeks the Tarascan Empire had passed under the Spanish crown.

Worse was to follow. The notorious Nuño de Guzmán, avid for gold, took over the conquered territory and proceeded to starve, torture, and enslave the Tarascans. Plagued by disease and driven by fear, the natives fled to the Sierra.

Yet the tragedy was to have a hero as well as a villain. Don Vasco de Quiroga, an eminent lawyer from Spain, was dispatched to right the Indians' wrongs. Promptly he laid out new towns, brought hope to the oppressed, and revived the Tarascans' ancient crafts. In 1538 he became Bishop of Michoacán (page 539).

He did not, of course, resurrect the empire itself, nor wholly restore its culture. Tarascan country now extends a scant 40 to 60 miles between Lake Pátzcuaro and the Sierra (map, page 519).

What the Tarascans have lost in power, however, they seem to have gained in hospitality. As I daydreamed by the door of my friend's cottage, his wife came up the street, bearing an earthen jug. Plunging her hand within it, she drew forth a glistening fish fully a foot long: the *pescado blanco* (white fish), prized throughout Mexico. Her husband had caught it that day, she said—and presented me with five others like it, wrapped in clean, wet grass.

I walked back to my lodgings, carrying the fish. In the Tarascan waters from which they came, I had been told, live curious species of primitive aquatic life. For Lake Pátzcuaro lies in a basin without an outlet. One odd inhabitant is a salamander, the *axolotl*.

Important commercially is the small minnow-like *tiró*. Tarascans catch them with their graceful *mariposa* nets, huge webbed "butterflies" which they use with skillful teamwork (opposite page).

Island of Janitzio

Janitzio, the island I had approached first with Tata Pedro, is the most important of the group. But the others are inhabited, too, and interesting in their own right.

In Jarácuaro at least one member of every family makes hats of palm strands. As these take shape, the hum of Singer sewing machines is heard throughout the town. Later the hats are blocked by steam and trimmed with colored bands.

On Friday the islanders stack their products, one upon the other, atop their heads and leave for the market of Pátzcuaro.

Even Jarácuaro's music teacher, Maestro Nicholas Juárez, is a hatter.

One fiesta morning I set out by canoe to visit the maestro. Following the sound of music, I arrived at last at Emiedio Pantaleón's house and stepped into a crowded courtyard

***Mariposa*, the Spanish Word for Butterfly, Named Pátzcuaro's Graceful Winglike Nets**

Fishermen operating with balletlike precision, stir water with paddles [illegible] through the [illegible]

Beneath a large guava tree, the 12 men of the town's [illegible] instrument band were leafing through the scores of the next number.

Some all were [illegible] but the French horn player, who was [illegible] chosen from [illegible] Slowly the band started a [illegible] At the close of the [illegible] I [illegible] the maestro's eye. Clarinet [illegible] took my arm, and we walked to his [illegible]

Soft Music and Cooling Breezes

Sitting with me in the shade [illegible] and I began to play delicate [illegible] tunes from an empty [illegible]

[illegible] Houghton brought [illegible] the [illegible] of the sierra to the shore of [illegible] Lake [illegible] their cargo of firewood and [illegible] up Lake

It was pleasant, but finally I took my leave and returned across the lake to Erongarícuaro. I wanted to be there for Sunday, which is market day and a magnet for Tarascans every where.

On Saturday evening [illegible] trains from [illegible] brought [illegible] from the [illegible] sierra to the shore of [illegible] Lake [illegible] their cargo of firewood and [illegible] up Lake

hitros, the Indians bed down by their stacks of wood to await the morning's trade.

From my lookout by the lake at sunrise, the large fishing canoes leaving Janitzio seemed mere dots on the horizon. Little by little, however, they took clearer form, and soon a hundred boats were heading in for the landing. Carrying paddles and baskets of fish, the islanders scrambled ashore.

In the square I saw bananas and sugar cane from Zirahuato, onions from Pátzcuaro, beans from near-by villages, and corn from Sierra towns. A Tarascan from Tingambato parted banana leaves in a wooden crate to expose large chirimoyas, a fruit delicacy from his town. A merchant from Guadalajara tempted passing natives with bits of jewelry, ribbons, and painted toys.*

By noon trading had passed its peak. Large stacks of wood had changed hands for fish, and lake dwellers soon faced their loaded trek to the shore. Boats were filled to the gunwales. One by one, the heavy laden boats shoved off to avoid the strong winds of late afternoon (pages 524 and 525).

Sierra Tarascans, adjusting their colorful serapes and upturned hats, headed their donkeys up the trail, leaving nothing but splinters behind.

Ruins Recall Tarascan Empire

For the Tarascans, the past is never far away. To the north, in Santa Fé de la Laguna, Bishop Quiroga's easy chair is enshrined. Here, too, is the site of the first of his Michoacán *hospitales*, centers of teaching as well as healing.

On the eastern shore of the lake lies Tzintzuntzan, "Place of the Hummingbirds," once the political capital of the Tarascan Empire. During certain festas, multitudes of overalled Spanish-Indian mestizos and satin-clad Tarascans in holiday mood scramble to the tops of old Tarascan ruins to enjoy the view of village and lake.

On such days a large market is held in the historic church courtyard beneath the shade of 400-year-old olive trees. Some of the squat, grotesque trunks are 10 feet in diameter (page 518).

South of town a mound of adobe mud and rock is all that is left of Michoacán's first church, constructed by Father Martín in 1526.

Near Thuatzio, "Place of the Coyote," five mounds of Tarascan ruins stand atop an ancient lava flow. Even in the present village, the old symbols of fertility have been carved in rock on the church façade, while high above, on a ledge of the steeple, crouches a large lava rock coyote. On the lintel are carved symbols of "Our Father the Sun and Our Mother the Moon."

Everywhere I heard tales of unexplored ruins in remote and wooded sections of the land, and often, in the hands of the mestizos and Tarascans alike, I saw stone idols, copper bells, clay pipes, obsidian knives, and large elaborately carved shells.

One day I revisited the colonial city of Pátzcuaro. Its cobbled streets, flanked with the overhanging roofs of many 17th- and 18th-century buildings, possess a strongly Old World flavor, bequeathed it by early Spanish settlers (pages 537 and 543).

Pátzcuaro, however, has its eyes on the future as well as the past. Here has begun a tremendous social experiment designed to reduce poverty and illiteracy. Twenty Tarascan villages, by-passed by most of man's technological improvements, have become a United Nations laboratory for teachers dedicated to stamping out misery in depressed rural areas all over Latin America.

Unesco, the UN's Educational, Scientific, and Cultural Organization, maintains its Pátzcuaro headquarters in the one-time home of former President Lázaro Cárdenas. Its training center is called CREFAL, *Centro Regional de Educación Fundamental para la América Latina*. Five schools like it are planned in other parts of the world.

Student specialists, learning their job while teaching Tarascans how to better their lives, demonstrate such sciences as home economics, health, rural economy, and social education. Mexico, Bolivia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Haiti, and Peru send trainees. After two years the graduates go home to teach others.

Into "Mouth of the Hot Land"

Ten miles from Santa Clara, the bus I rode plunged down a steep escarpment into the *boca de tierra caliente*, or "mouth of the hot land," the southernmost point of the present Tarascan area.

Here, below the high volcanic plateau, I entered a region where large springs and gushing underground rivers have created dense jungle growths.

In semitropical Uruapan I found the center of the Mexican lacquer industry and the shop of Leopoldo Elvira. As I entered his establishment, my ears were met by the strains of Beethoven's Fifth Symphony.

Young workers around a large center table were cutting intricate designs in partly lacquered trays. In a corner of the room Leopoldo was thumbing through an album of Brahms records.

"My men are craftsmen," he explained. "On exacting and delicate work like this, they

* See "Venetoes of Guadalajara," by Frederick Simpich, NATIONAL GEOGRAPHIC MAGAZINE, March [illegible]

A Tarascan Fisherman and Dazzling Nets Bursts into Smiles and Shows Off His Catch

Jamaica Island Indians, Having Bartered Their Fish, Lead Dugouts with a Week's Supply of Firewood

Men Heave Against Shore, Women Strain Against Paddles to Launch a Hundred Canoes . . . An Oldster Sews His Nets

[illegible]

Lake Pátzcuaro Folk Celebrate January 12 Fiesta with a Bareback Rodeo

Amateur riders volunteer to master a [illegible] in the [illegible] ring. A [illegible] to the Virgin of [illegible] in Indian [illegible] January [illegible]

Hundreds in Napizaro Line the Stone Corral. Boys Use Tree and Reed as Grandstand Seats

[illegible]

Petrified Ghosts of Dead Volcanoes On the Valley of Chelan, Not Far from Pasiones

[illegible]

Carved Door, Copper Kettles Illustrate Old Indian Arts

Janizin Girls Resort to a Bit of Gossip with Shy Suitors and a Tumultuous Giggle

[illegible]

need a relaxed atmosphere, something that will relieve tension and fatigue. This music seems to do the trick."

He picked up a tray, examined it, and put it down. "And that's not the only measure I take," he added. "Every day at 1, the boys and I head for my ranch and spend the early afternoon swimming in the Río de Cupatitzio. Limbers up the muscles, you know."

Leopoldo's workroom was a riot of color, so elaborate was his display of finished trays. I could understand now how this lacquer craft had brought fame to the area in both pre-conquest and modern times.

In pre-Cortesian days Tarascan rule extended south to the Sierra Madre del Sur. Coyuca de Catalán, on the Balsas, was the center of the southern empire, known widely for its gold work. Today goldsmiths still ply their craft in half a dozen villages, including Los Placeres, appropriately located on the River of Gold (Río de Oro).

One cloudy and dismal December morning I left with a guide for the Tarascan Sierra. Traveling west by horse from Erongarícuaro [illegible] hug volcanic slopes.

Until recent years Cherán was one of the region's typically isolated settlements. Today it is split by a modern asphalt road which starts at Carapan, on the Mexico City-Guadalajara highway, and runs southward to Uruapan. A town of approximately 3,400, Cherán is still 87 percent Tarascan, and its Indian customs have changed little.

The streets were deserted and cold, for I arrived during one of the winter rains. Clouds scudded swiftly down from the north and swept across the town toward the valley below, where cinder cones rose 800 feet above the cultivated floor (page 528).

Wooden Houses Have Oriental Look

To the east bare-limbed willow trees framed a small group of wooden *trojes*, big houses with an Oriental look to them (page 533). Beyond, El Pilón, a 10,000-foot volcanic peak, rose from its clouded base into a darkened sky.

Taking refuge under the plaza portals, I relieved the chill by drinking a cup of steaming orange-leaf tea. Across the street, beneath overhanging roofs, a group of young boys crowded close together. Their bright ponchos provided the only spark of color in an otherwise dreary setting.

Here in the Sierra live 60 percent of the Tarascans. To these hills the lake Tarascans and subject tribes fled during the Spanish conquest, returning by necessity to the nomadic life of their earliest ancestors. Though Quiroga and Father Juan de San Miguel later brought new courage to the exiles and started the resettlement of the Sierra valleys, many Tarascans remained.

Living in Cherán today, I found an American couple, Mr. and Mrs. Maxwell D. Lathrop, and their children. [illegible] are translating the New Testament into Tarascan, publishing a newspaper in that language, and teaching the people to read.

President Cárdenas Hailed from Tarascan Country

"Tarascan has no known kinship with any other Indian tongue," Mrs. Lathrop told me. "Twenty-five years ago children were punished for speaking Tarascan in school, but all that has been changed now, thanks to President Cárdenas, who came from this Tarascan country himself.

"Written Spanish baffles Tarascan children, though their IQ is high. Learning to read their own language, they assimilate in six months what it takes three years to learn in Spanish.

Tarascans are quick in repartee; they are full of puns. We felt we had arrived when we made our first play on Tarascan words, and it still thrills us to find the right Tarascan phrase to express a baffling idea."

The Lathrop children grew up speaking Tarascan. When someone at the dinner table uses English, they shout, "Gringo!"—an odd word coming from children of an American family.

Since both the four children have been taught not to drink unboiled water or eat unwashed fruit, both dangerous practices in rural Mexico. When Alice was 3 years old, she was asked to name man's first fault. "Adam's sin," she answered, "was to eat fruit before it was washed."

The next day I left for Paracho, widely known in Mexico for its guitar industry. There I called on Camilo Nava, a young Tarascan schoolteacher who had agreed to accompany me through parts of the Sierra.

We started our trip on December 20. Bouncing along at first in a taxi, we ended up riding horseback through the mountain wilderness and spending cold nights in old trojes under the shelter of a few serapes spread on the floor.

In San Felipe we saw curious wrought-iron work on the church door and on the doorknobs of the village dwellings—figures of birds, dogs, soldiers. These adornments are remnants of a once-thriving industry. Today it survives only in a few blacksmith shops, where I saw axheads and plows being hammered to sharp blue points.

On horseback we continued our journey through thickly wooded pine areas to Tatanz-

A Gem of 16th-century Art Is the Carved Stone Facade of Angahuan's Church

Travelers seldom gazed upon [illegible]

Charcoal Builds with Wood — Roofs in Adobe Mexico

Tarasco' frame structures, called *trojes*, are known to have existed since the first quarter of the 16th century but their origin is unknown. Spain, which introduced so many styles into colonial Mexico, [illegible] to have had no [illegible] [illegible]

bull, where good pottery is made. Covered with a copper glaze, the pottery is celebrated throughout Mexico.

On the fourth day we arrived at San Lorenzo, a village of about [illegible] Now we were within earshot of Tarasco explosives.

In one of the many [illegible] a young Tarasco sat strumming his guitar. Long black hair rolled over his [illegible]. He had worn [illegible] high at the angle of his head. About his neck he wore a brilliant green kerchief in [illegible] pink-and-white blouse. [illegible] stripe was gracefully draped. Suddenly his dark, round face grimaced, and he burst into song:

Strategy of Stealing a Bride

By the village fountain we found [illegible] [illegible] (see page 546). Disconcerted by our inspection, the girls giggled and hid their faces. I was inclined to linger, but Camilo urged me to leave.

"Be careful, Justino," he said [illegible]. "Wells and public fountains [illegible] are the scene of many courtships. Unless you want to steal a girl to be your bride, [illegible]

[illegible] As in the days of the conquest, Tarasco youths frequently [illegible] their brides—with the [illegible]

The [illegible] at the [illegible] mountains of [illegible] lages, where the girls come to fill their water jars. The [illegible] evening, when [illegible]

The girl may be [illegible] voluntarily or [illegible] she leaves church or school [illegible] over then runs with her [illegible] relative's home [illegible] refuge. Friends [illegible] groom's family soothes the [illegible] The marriage is formalized by civil authorities and followed by elaborate ceremonies

In Angry Mood, Parientin Bombards the Tarascan Sierra (Taken on Infrared Film)

Planter and Son Survey Mountain-ringed Patzcuaro, Mexico's 6,000-foot-high Lake

[illegible] boats stand moored, and [illegible] the water weeds. Some residents [illegible] Whenever the [illegible] wide bay are [illegible]

Occasionally the girl is the aggressor. A young [illegible] married simply because [illegible] but scornfully observed, "You're not man enough to steer me!"

After wandering some [illegible] with Patzcuaro's coast, we arrived at the home of Pedro Alejo. Upon welcoming his friend Cristóbal, Patzcuaro offered us shelter for the night.

Early in the evening we sat on tiny chairs in the [illegible] lighted by burning pine. A dish of beans, tortillas, coffee, and light chatter carried us into the night to the hour of the festivities. About 10 o'clock Cristóbal and I wrapped in our blankets, [illegible] down the pathway to the chapel.

As we entered the chapel courtyard, I saw the musicians gathered around a small fire. Lumbering figures gave life to their stiff poncos. Farther [illegible] covered by dark-blue shawls entered the chapel and knelt in prayer before the Virgin Mary. Her portable altar was embellished with flowers, strips of colored paper, tortillas, ears of corn, and fruit.

Soon the musicians hitched their serapes across their shoulders and started to tune their instruments. The resulting confusion of sounds awakened the night. Young girls representing shepherdesses, dressed in blue and white and wearing flowered straw hats, strode into the chapel, shouldered the shrine, and started a procession toward the home of one of the townsmen in charge of festivities.

Christmas Play: Angel Chases Demons

Dutifully the musicians fell in behind the shrine and struck up [illegible] vigorously classical. Villagers followed in silent procession. Suddenly, flaming torches and [illegible] gave dissipated the darkness and revealed [illegible] dressed dancers in the lead.

When the parade had reached its destination, the Virgin was deposited in a temporary shrine next to an image of the Christ Child. Tarascans then crowded into every available space in the courtyard. Boys, leaning from perilous positions atop wooden fences and

Pátzcuaro Girls Enjoy the Winter Sun in the Cobbled and Ascending Calle de San Miguel

[illegible]

branches of nearby trees, waited impatiently for the dances to begin.

Dancing before the Christ Child, the shepherdesses sang softly. Amusing devils in sparkling [illegible] costumes rushed in. "[illegible] the Holy Child," [illegible] dressed in white. A winged angel [illegible]. At this the demons accepted defeat, though defiantly [illegible] their power over [illegible]. As the demons retreated, [illegible] hermits in conical hats and gray robes [illegible] upon them and struck them with whips of [illegible], to the great delight of the audience.

The fiesta was far from being ended, but, hearing bells ringing, we hurriedly left for the church. Entering its interior with our flashlight, we found the floor covered with [illegible] women who had entered to seek refuge from the cold and await the ceremonies. Now they began to stir, and one or two homemade candles were lighted.

As the sacristan appeared, the [illegible]-borne Christ Child and Virgin were brought through the main doorway and deposited on the altar. As if by signal, a murmur of prayers ran through the church, and hundreds of candles seemed to glow at once. In the soft light, the stream of visitors was lost.

Dance Is Reminiscent of Africa

Looking back, I saw eight black-masked "negrito" dancers enter and approach the center of the nave, where they clapped hands and danced to a monotonous guitar accompaniment. With their masks, [illegible] costumes decorated with [illegible] bells, [illegible] and tiny metal [illegible], the [illegible] might well have been dancing somewhere on the African Continent.

As the service neared its end, a group of women [illegible] to imitate the song of birds. [illegible] at the foot of the [illegible].

Carola and I walked quietly to the back [illegible] the doorway with the [illegible] of the [illegible]

behind them, stood the three devils in their flashing costumes and glittering crowns. Wrapping our blankets tightly about us, we gave the demons a wide berth and walked out into the night.

Tarascan dances, performed in nearly all villages during main fiestas, vary with each locale. For one of the most popular, the masked *Viejitos* (Little Old Men), the dancers of Cherán don wrinkled pink masks of clay, wigs of white horsehair, flat straw hats, serapes, and pants embroidered at the cuffs. In mimicry of old men, they lean heavily on wooden canes. Their steps, intricate and lively, are accompanied by guitars.

In the Sierra region, however, viejito dancers wear light-colored wooden masks to simulate the features of the Spanish conquerors of long ago (page 545).

In the graceful dance of the *Canacas* (Crowns), which I saw in Tingambato, Indian girls in native costumes made offerings of fruit, pastry, and flowers to the visiting Bishop of Zamora—a modern counterpart of an ancient ritual which honored Xaratanga, one of the old Tarascan goddesses (page 544).

From San Lorenzo, Carlos and I at last launched our long-anticipated trip to Paricutín. Catching a bus on the dirt road that skirts the volcano, we rode eight miles to the village of Angahuan (page 532).

Along the way we were able to catch short glimpses of the "Angry God of the Sierra," and the rising column of smoke from its crater was continually in view. As we neared the village, the greenish countryside turned pale. Soon the bus was gliding smoothly over long stretches of cinder and ash.

Forests Killed by "Angry God"

We got off the bus in the midst of a desert waste that was once a fertile cornfield. Walking with difficulty across its porous surface toward the village, we fought a strong south wind which raised a whirlpool of cinder dust high into the sky.

Down the desolate lava-dust streets of Angahuan we walked until we came to the churchyard. There we rested by a tall stone cross. Tarascans, harassed by the wind, scurried past us, crossed the yard, and entered the shelter of the church.

Southward, clouds of dust seemed to darken the landscape. Above and beyond them Paricutín's eruptions diluted the blue sky into colorless gray. Although it was five miles away, the volcano brooded menacingly over our little village.

Eager, nevertheless, to see the angry god at closer range, we left by horse for the cone itself with Jesús Saldaña, a young Tarascan guide. Skirting a stout 20-foot wall of lava, we rode to a point west of Paricutín and from there traveled by foot. We crossed wide gullies and started climbing through a ghostly forest of [illegible] trees, whose bark and leaves had long since been killed by showers of volcanic dust. To the south, low hills showed deeply eroded crevices and spiny surfaces. Their woods, once lushly green, now resembled bristles on the backs of dormant gray monsters.

As we climbed, we passed over thick deposits of ash and cinder, their smooth surfaces broken by innumerable crannies and pockmarks where pieces of rock blasted into the air had buried themselves out of sight. Across this strange wilderness, as desolate as the face of the moon, an aimless yellow butterfly fluttered as if lost.

Eruption Drives Climbers Back

In the background rumbled the volcano's large, half heard, half felt, the only other sound was the constant tacking of falling particles of lava dust on our hats.

At last we arrived at the foot of the cone, whose sides rose almost a thousand feet above the surrounding lava field. Deceptively symmetrical and smooth from a distance, these slopes proved actually to be littered with jagged lava deposits.

Though the crater was spouting lightly, we ventured a try and defiantly climbed to within 300 feet of its crest. There a sudden quaking beneath our feet stopped us short.

A moment later, hot lava flew high into the air above us and fell back down the inner sides of the crater and the outer sides of the cone. Smoking red particles tumbled around us.

We required no further warnings; we beat a hasty retreat. Clearly, we had encroached upon sacred ground and had incurred the wrath of the angry god.

That moonlit evening we watched Paricutín's further eruptions from a more comfortable spot, a geological station several miles away (pages 534-5).

Since it burst from the earth, Paricutín has buried Tarascan villages and covered fields of corn with cinder and ash over an area of at least 60 square miles. Rising 1,500 feet above the original plains, it has vomited lava over a radius of some two and a half miles on the north side of the cone.

I thought, gazing at the volcano's gaudy pyrotechnics; surely the Tarascans have suffered enough. Surely their once-great domain has been sufficiently constricted without the subtraction of still other acres. But the angry god only muttered the more, and the soft ash fell unceasingly upon the remnants of an empire and a civilization.

Michelangelo's Bishop Quarrego Teaches Crafts to Incarnate a Laborers Morale in Patzcuaro

[illegible]

Mamera and Her Helpers Put Finest Cakes in a Tarascan Kitchen

"I Offer My Last Six Fish" Elodie Campos Tells the Forester, "for Another Load of Your Firewood": Evangeline

Hand in Dagger, a Moustached Warrior Guards Pasquarel's House of the Giant

Patzcuaro's Canopylike Eaves Might Have Come Entire from Spain

Tassoni's Dark-eyed Beauties Offer Custard Apples, Butterfly Fishing Nets, and Dashing Smiles

[illegible]

Fresh Off Gauze Masks, Guinea Lizards Up Faces; Bowls Are Wiped Dry

San Lorenzo Girls Rinse Hulled Corn at the Fountain, Their Favorite Trysting Place

Pilgrimage to Holy Island and the Farnes

Hundreds of Pilgrims Wade Across Gleaming North Sea Sands to Visit This Lonely Center of Christianity in Northern England

By John L. H. Nolan

A few miles off the Northumbrian coast, a handful of small islands lie in the churning North Sea. They are little known to most British mariners; coastal sailors, however, mark them well, and carefully sail wide around their sharp, rocky promontories and treacherous reefs.

The smaller islands, some 25 of them, are called the Farne Islands. About half of them are under the sea at high tide; those that don't submerge are inhabited by thousands of birds, which build nests on stony ledges or lay eggs in the sand along the shore line.

A larger island, shaped like an ax, lies northwest of the Farnes. It is Holy Island, or Lindisfarne, three miles long by a mile and a half wide at its broadest part, but narrowing in places to only a few windswept yards (map, page 551). Unlike the Farnes, it boasts a village, four inns, and even taxicabs.

Amphibious Taxi Has No Brakes

Unlike the Farnes, too, it can be approached by land, but only at low tide, over nearly three miles of wet, oozing sands. Visitors sometimes walk across the flats barefooted; a few come in horse-drawn carts.

Being a journalist by profession, I was visiting Holy Island and the Farnes on business as well as for enjoyment. So my own visit began more prosaically, by taxicab. Eighty-one-year-old Robbie Bell, postmaster of Holy Island for 48 years, had a car to meet me at Beal, a small railway station a mile from the Northumbrian shore.

I was greeted there by a water-splashed, hatless scamper of middle age, wearing thigh-high rubber waders. He introduced himself simply as "Gow." Drawing on an old pipe, he was lounging against the battered body of a 1928 Ford. Spattered with sand, the car still dripped from its water passage.

After being forced to wait until that famous train, the Flying Scotsman, had flashed past, Gow energetically cranked the engine. It finally reacted with an ear-splitting bang; then off we rattled over the still-quivering rails, bore up a steep bank, and went down a mile-long slope between fields in which black cattle were peacefully grazing.

The car had no brakes, for brake linings last no more than a month in the salt and sand. There was no halting our mad ride; when we arrived at the bottom where flats and mainland met, even a change of gear failed to stop our rusty chariot from leaping a pile of rubbish left by the receding tide. Beyond us then, through a thin veil of sea mist, I dimly discerned the island.

Planted across the sands, and leaning at all angles, was a line of 20-foot poles encrusted with barnacles (page 559). Stuck up at frequent intervals, they simposted the route through a crossing of the stream Lindis (better known as the Low) to the main part of the island. That trail, unused by anything on wheels, is called the Pilgrim's Way (pages 548-549).

A second set of poles, swerving northeastward toward the Snook at the ax handle's end, marked the entire route we followed.

The car plowed through inches of water, driving showers of spray into a crack in the windshield, and I was soaked by the time we wallowed in bottom gear through another crossing of the Low.

Since taking off across the flats, my companion had been cheerily singing

> I'm a young fisher lad, just landed from the sea,
> As happy as the jackdaw squawking in a tree
> Lively as the little fish that in the ocean swim—
> Wet or dry, 'tis all the same to Holy Island Jim

Now, as our near front wheel stuck in a submerged pothole, his song ended with an "Scotlandish" curse. Gow struggled with his gears; steam rose from the radiator, and water seeped through the floor boards.

A ride over sands covered with casts from millions of lugworms (page 552) and through pools of water brought us to the last pole. Gow veered, driving along the handle of the ax past a string of sand hills, then through more water, until there loomed before us, in the words of Sir Walter Scott:

> A solemn, black, and lark-red pile
> Placed on the margin of the Isle

Priory Marks St. Aidan's Church

It was the red-sandstone ruins of a great church, the island's Norman Priory. A delicate-looking arch, curved like the rainbow, seems to thrust heavenward (page 553).

That ruined Priory is still regarded by the islanders as the great wonder of their world. In the course of years it succeeded a church and monastery founded A. D. 635 by St. Aidan, the island's first bishop. Holy Island was

Shoes in Hand, Pilgrims Splash Across a Tidal Flat to Britain's Holy Island

[illegible] North Sea [illegible] from [illegible] Northumbrian mainland. But [illegible] these sands connect [illegible]. These [illegible] pilgrims, with a clergyman here and there [illegible]!

[illegible] Northumbrian history.

Mr. [illegible] explained that although the monk Bartholomew and such saints as Aidan, Oswald, Finan, Colman, and Wilfrid [illegible] great respect by the [illegible], the best-loved saint is St. Cuthbert, the former shepherd boy who loved and protected the [illegible] of birds.

After becoming Bishop of Lindisfarne, or Holy Island, [illegible] St. Cuthbert [illegible]. He [illegible] a hermit on one of the Farne Islands, following [illegible] and self-mortification, which [illegible] for hours while standing up to his neck in the sea.

As we [illegible] over what appeared to be [illegible], I thought I saw a long [illegible] of black dots stretching [illegible] the island across the sands. [illegible] these were piles of stones [illegible] to guide them [illegible] the mainland (page 552).

Pointing to the approaching sea, [illegible] about the tides. [illegible] the island for two hours before and three hours after high water. Jerking his [illegible] toward a strange [illegible] the vast [illegible] sands.

[illegible] seeing [illegible] of these queer-looking structures were built to give wayfarers a chance of escape if caught by a tide on the flow (page 555).

[illegible] lives have been lost. One man [illegible] his cycle against a [illegible] when he saw the tide [illegible] the island [illegible] and was swept away. Had he but known, he could have reached safety, as the water when he stopped was only a foot deep.

Midway down the [illegible] edge of the [illegible] road.

Village "Nae Goot a Name"

A smooth, well-kept thoroughfare, running half a mile to the village, led us along [illegible] carefully tilled fields where one of the island's three tractors was working.

White and gray cottages, [illegible] built of stone, and with blue [illegible] or red Dutch tiled

Sheets of Water Left by Retreating Tide Mirror the Advancing Procession

[illegible]

[illegible] greeted me as we swung under [illegible] arches and drew up at the [illegible] Hotel.

Having [illegible] I asked [illegible] the names of the villagers.

"[illegible]," he responded [illegible].

"Not got names?" I [illegible]. "[illegible]"

[illegible] asked. [illegible]

But [illegible] all the [illegible] and did [illegible]. Each, it [illegible], had [illegible] proper name and a nickname, and it was by the latter that they were introduced to me: Brona, Ta-n, Huka, Wonka, Te-ick, Geoge-ed, [illegible], Bo-bo, Doe-Doe, and De-Da, the last belonging to a [illegible]-haired young creature of [illegible], whose [illegible] eyes and straw[illegible] complexion bespoke her Viking [illegible].

I was also greeted by six spaniels, and by [illegible], about whom I learned more [illegible] when he [illegible] into my room and zoomed away with a pair of precious cuff links.

Questioning elicited the fact that the bulk of the population of about 350 is composed of 21 families, nearly all related in some degree. [illegible] Lilburns, [illegible] and [illegible] back four centuries.

[illegible] that the little community [illegible] with the problem of [illegible].

[illegible] the fact [illegible] football team of [illegible], I found there were only [illegible] young men between the ages of 18 and [illegible].

Eligible Women Are Few

Young women are nearly [illegible] men. Forty percent of the gentler sex are between 30 and 50 years of age [illegible] percent between [illegible]. Of the men, [illegible] are between 40 and 60.

I [illegible] over 70 [illegible] over 80 and one over 90. There were only 35 children under the age of 15.

The typical Holy Islander is lean, wiry, keen-eyed, and capable of great endurance. I came to know him as kind-hearted and hospitable. He possesses, however, [illegible] temper and is quick to resent [illegible]

Holy Island Housewives, Lacking a Meat Shop, Welcome the Itinerant Butcher

[illegible] plenty of crabs, lobsters, and other seafood. A [illegible]

civilians. For his [illegible] His courage and patriotism [illegible] all [illegible] volunteered in the last war. The Navy [illegible] the Army and Air Force two each.

There are no police on Holy Island, and no [illegible] there is no real crime. [illegible] Berwick [illegible] miles away. Mainland laws hold good except in one respect—the closing time for the public houses.

[illegible] visiting the island for the last [illegible] when a local woman [illegible]

closing regulations. He may claim that the village is outside [illegible] and therefore [illegible] can keep their bars open all night if they wish.

[illegible] glancing at his empty glass.

[illegible] was filled by one of the [illegible] Nevertheless, [illegible] said to me. We [illegible]

[illegible] was Old Dick [illegible]

An shaped Lindisfarne, England's Holy Isle, Lies 14 Miles Below Scotland

[illegible] struck it rich [illegible] flaming the sea off into the North Sea, chasing into the 1,000-acre isle of Lindisfarne. Here 7th century monks built a church and set forth to convert northern England. The name "Holy Island" came into use after Danes slew many monks. Numerous pilgrims visit this early Christian stronghold.

rugged for all his 87 years. One evening, after downing two rums and two beers, he was ready for more when Old Tom Stevenson, four years his senior, advised him that it was long past his bedtime. That upset Dick; so, joined by Old Bobbie Bell, six years his junior, he broke into a sea chantey. Finishing that, they rose soberly but slowly, thanked me for a pleasant evening, and went off to bed.

With the neighboring Farnes, whose merciless fangs have ripped the bottom from many a good vessel, the Holy Island area has probably claimed more wrecks than any similar-sized section of Britain's coast.

In the 1500s, after Henry VIII dissolved its monastery, Holy Island became a place of ill [illegible] on the cliffs, enticed vessels to destruction on the rocks and sandbars. Even the children ended their night prayers with "Dear Lord, please send a ship ashore."

Islanders Do Skilled Job of Salvage

De-Da showed me the meager only remains of Luff a dozen vessels lying partly buried in a sand ridge off the north shore. In World War II, mined and torpedoed ships were stranded there; others were wrecked because of the rigid blackout of lighthouses.

Village s. Crushed by Carronades do Chinos, Tramp Steamer a Sea of Worm Casts

Old [illegible] still [illegible] four feet [illegible]

The islanders can tell some remarkable stories of salvage work. During the war the 2,000-ton *Friars Bound*, a Dutch vessel was driven on a [illegible] rocks, where at high tide it stood in less than [illegible] feet of water. Maitland experts, who are used to salvaging the ship, were watched [illegible] by the [illegible] men. [illegible] two weeks the [illegible] professionals gave up, leaving the [illegible] so they thought, to be broken up by the weather (page 558).

That was the islanders' opportunity. In six weeks they dug a colossal amount of [illegible] from around the hull and cut a channel [illegible] deep water, which they banked with thousands of sandbags. Then [illegible] tug [illegible] refloated the freighter.

Next day two islanders visited Berwick upon Tweed [illegible] their claim [illegible] reward. [illegible] the islanders [illegible] for [illegible].

[illegible] told me about the [illegible] cargoes washed ashore [illegible] Chinese bank notes, [illegible] cigarettes, candles, [illegible] rope for [illegible] months. This last was a godsend, as the island has few trees.

When the Chinese bank notes were found up from the [illegible] with thousands of [illegible] money). They had [illegible] however, when they learned that the whole note issue had been [illegible]. The [illegible] kept packets of this worthless paper, hoping that someone, someday, will make an offer for the lot.

Said Bella Kyle, hostess of the Castle Hotel, "Ye kin have thees one," and she gave me a handsome blue bank note embossed with the head of Sun Yat-sen.

Where a Pig Is Not a Pig

I tried to follow the loud [illegible] speech of those who were gathered [illegible] ning around the fire in the Northumberland Arms. Ends of sentences seemed [illegible] as if [illegible].

The dialect is neither Northumbrian nor Scottish, but distinguished from both by many different words and idioms. By concentrating I was [illegible] understand a little of what was [illegible].

Children Kneel Beneath the Skeleton Arches of Lindisfarne's Historic Priory

[illegible]

Anglican Clergyman Dries His Feet after a Wet Crossing

[illegible] Holy Island [illegible] Here the Bishop of [illegible]

covered, does not [illegible] these people from killing and eating [illegible]. But [illegible] will turn back rather than [illegible] to sea.

When I [illegible] one of the [illegible] the word [illegible] eating a ham sandwich at the time, he [illegible] replied: "Aye, mae mon! eel's queer but ham's ham, and yon's a different thing altogether."

As I [illegible] the wind was [illegible] blowing at [illegible] miles an hour. [illegible] Island [illegible].

I [illegible] store [illegible]. In one [illegible] feet wide, old Mrs. Cromarty's broad smile welcomed us across a counter stocked with a [illegible] variety of [illegible].

[illegible] vegetables, [illegible] soft drinks, [illegible] other odd-ments.

I [illegible] over the [illegible] of Newcastle United Association's famous football team, though only [illegible] that team [illegible] twenty years.

Presently I caught a whispered aside from [illegible]: "Quick, [illegible]!"

"Aye," [illegible] the fisherman, with a quick glance at me. [illegible]

Wondering what [illegible] "thing" [illegible] meant, I suddenly recalled a paragraph I had read in a London newspaper only the previous week. Fishermen of Holy Island, off Northumberland, won't use the word pig. They call it "the thing."

Incidentally, a man from the mainland [illegible] there to run a [illegible] the island [illegible] Mr. [illegible] Mr. Thing.

The aversion to [illegible] a pig [illegible] Holy

In the post office [illegible] and [illegible] from [illegible] a newly [illegible] packets of [illegible] sheets of postage stamps [illegible] newspapers.

"Special Delivery," Holy Island Style

Lu-Lu, sturdy and beaming, was in charge. Deputizing for her [illegible] the [illegible] was [illegible] the morning mail. She makes the deliveries herself. Never knocking at the houses, she walks straight in [illegible]. And when she's not [illegible] the [illegible] (page [illegible]).

Heavy [illegible], such as [illegible], is brought from the mainland [illegible] eight miles [illegible]. Often [illegible]

Spindle-legged Rescue Box Shelters Youngsters Trapped by Tide. A Rescue Car Nears

[illegible]

[illegible] and have to be dragged [illegible]

[illegible]

Bare Faces on Bathing

[illegible]

Girls are [illegible] the sea—[illegible] water. [illegible]

[illegible]

A great change has taken place in the [illegible] of bathing [illegible] Now there is a life in [illegible] bathing, the [illegible]

[illegible] and privacy [illegible]

Robed Choristers Hiking to Holy Island Laugh as Incoming Tide Tickles Their Feet

[illegible]

visitors sometimes [illegible] the sands [illegible] by practicing airplanes in the last war. [illegible] 1940—about [illegible] provide [illegible] of the [illegible] Holy Island's [illegible] except for one [illegible] [illegible] keep the [illegible]

Prior to [illegible] Island was the [illegible] of the island [illegible] the old [illegible] now do duty as sheds for [illegible] and lobster pots, nets, and ropes. [illegible] They stand [illegible] on the beach at the Ouse, [illegible] below the walls of the Castle on Beblowe Crag, whose [illegible] keeper "Whereas [illegible]"

[illegible] of these small fishing craft [illegible] with the coming of [illegible] only seven small motor fishing vessels [illegible] the largest [illegible] tons.

Wandering up to the schoolhouse, I met Mr. George Rowe. Since he arrived [illegible] worked wonders with the children. [illegible] were making rapid progress under the former Air Force [illegible] officer.

All the same, the old schoolhouse remains a headache to teachers and a [illegible] to pupils. Built in [illegible] and wired windows seem more a [illegible] than a suitable place for new life to be molded.

Brides Jump the Petting Stone

Although no [illegible] on the island for two years, when one does occur it [illegible] ancient custom.

Following the wedding ceremony in the parish church, the [illegible] the Petting Stone, reputedly [illegible] of a Saxon cross which [illegible] As the [illegible] without touching it [illegible]

[illegible] jump the [illegible] appear [illegible] then walk [illegible] which has been [illegible] is [illegible] outside, waiting [illegible] pass a 12-shilling toll [illegible] the bridegroom

When the fee has been handed over, he whips out his clasp knife and cuts the tape.

The [illegible] leg and [illegible] foot [illegible] spent in the lines, when the newlyweds stand [illegible] expected to [illegible] and everyone has had enough. This expense, no doubt, explains why [illegible] celebrating their truth on Holy Island.

Setting out [illegible] Hotel I [illegible] the street called [illegible] Street. [illegible] the [illegible] Square, where [illegible] quaint two turnstiles. After crossing a sloping meadow encompassed by rough stone walls, I finished in Hagg Cliff [illegible] of Northumberland's great stretch of basaltic rock, the Whin Sill.

A couple of hundred yards further on, I came to the island's war memorial a tall stone cross. It stands in the shadow of the newly built [illegible] the most up-to-date [illegible] the Holy Island.

Standing [illegible] height, I could see [illegible] across the island. To the south spread the [illegible] shore, where a few fishing craft were [illegible] in the blue-gray waters. In the distance, on the mainland, [illegible] Castle, which some people identify with the [illegible] Dinas Eiddyn [illegible] in the stories of King Arthur and his knights and [illegible] but I couldn't come [illegible] to me.

Between me and that dark [illegible] on the [illegible] the dying sun [illegible] the [illegible] of St. Cuthbert [illegible] desire [illegible] for [illegible].

Search for St. Cuthbert's Beads

On the shore of the [illegible] two [illegible] women [illegible] and knees [illegible] other jetsam. They were [illegible] the stems of the fossil [illegible] whose cylindrical joints are known locally as "St. Cuthbert's beads." Finely [illegible] necklaces, they are so [illegible]

Sisters Make a Wish on Island's Tumbledown Perring Stone

For luck, brides trip over this church-and-stone, sacred to Holy Island's two oldest men. A clean, crisp bridge leads to the island and a 12-shilling [illegible]

with pearls, it may take years to secure a [illegible]

Presently [illegible] wandered along the northeast shore to [illegible] Emanuel Head, where [illegible] on lime-worn rocks [illegible] protrude [illegible] of limestone [illegible].

The [illegible] also [illegible] chocolate [illegible] with [illegible] of [illegible]. The [illegible] could never have [illegible] to [illegible] station [illegible]. It stood [illegible] post and [illegible] nest for the Home Guard [illegible] Island in the last war. From it, on one occasion, elderly Guardsmen [illegible] on the unscathed crew of a shot-down German bomber, firing [illegible].

To the east, [illegible] and rather evil-smelling little bay, whose [illegible] is strewn with stones of crabs and [illegible] by [illegible] castle on Beblowe Crag, the highest [illegible] on the island. A [illegible] bridge [illegible] crowned by a Castle [illegible] in children [illegible].

Erected about 1550, its 4-foot-thick [illegible] were made of stones taken from the ancient Priory. In 1675 the rugged Castle housed the


PRINS KNUD
DANMARK

Hole Islanders and Heroes Dig Out a Stranded Dunes Vessel

[illegible]

3 Gresbrands Eyrie near the Castle on Bebbanburg Crag

[illegible]

4 Cross Marks the Spot of a Saint's Retreat

[illegible]

Sally Greenaway Wants on Customers in Her Hughidsgnolds Guest Store

Holy Island [illegible] drugs [illegible]

[illegible] Capt. Robin Rugg [illegible] governor of the island, whose salary was always mortgaged in advance to pay his wild drinking parties.

[illegible] little warfare the Castle [illegible] and later [illegible] two [illegible] James [illegible] known [illegible] Pitcairn. [illegible] it is occupied by [illegible] whose liberal [illegible] have [illegible] benefits on the island. In 1911 [illegible] gave it to the National Trust.

Wanderings of a Saint's Body

From my vantage point on the Heugh the old Priory [illegible] out below me.

To the right, just outside a ruined wall, I could see the faint outline of a cross carved in the [illegible] of an ancient stone coffin. The last resting place of one of those courageous souls who, [illegible] hundred years before, had sailed forth to convert the northern part of heathen Britain.

I thought of the saint, St Cuthbert, and of the many peregrinations of his body. When it was brought back to Holy Island from the Farnes, after his death in [illegible] the monks carried it in such a [illegible] Eleven years later the coffin was opened in order to place the body in a smaller coffin. On the exemption [illegible] reduced to [illegible] the bodies of the Venerable Bede were found [illegible] and the nose still [illegible]. Even the clothing and [illegible] was recognizable. [illegible] to sleep once more within [illegible] Chorister [illegible] the [illegible].

In 793 the Danes landed on the Island but did not [illegible] the coast.

In 875 the [illegible] again, but the monks had [illegible] coming before the raiders [illegible] high-prowed craft. The [illegible] the [illegible] with them. [illegible] also [illegible] the exquisitely illuminated Gospels of Lindisfarne, which had been written about [illegible]

[illegible] Ireland [illegible]

Postmistress La-La Bell Sorts the Morning Rounds with a Letter for Her Father

[illegible] Bell, the white-haired postmaster, turns over most of his duties to daughter La-La. [illegible] of the Royal Mail van, he accepts the day's first letter [illegible]

[illegible] Mississippi was [illegible] The sea, however, [illegible]

For a few more [illegible] remained the northern wilderness [illegible] Well [illegible] the departure of the Dutch, the traffic [illegible] to Chester le Street, a former Roman [illegible] Durham [illegible] for [illegible] Later [illegible] to [illegible] Newcastle [illegible]

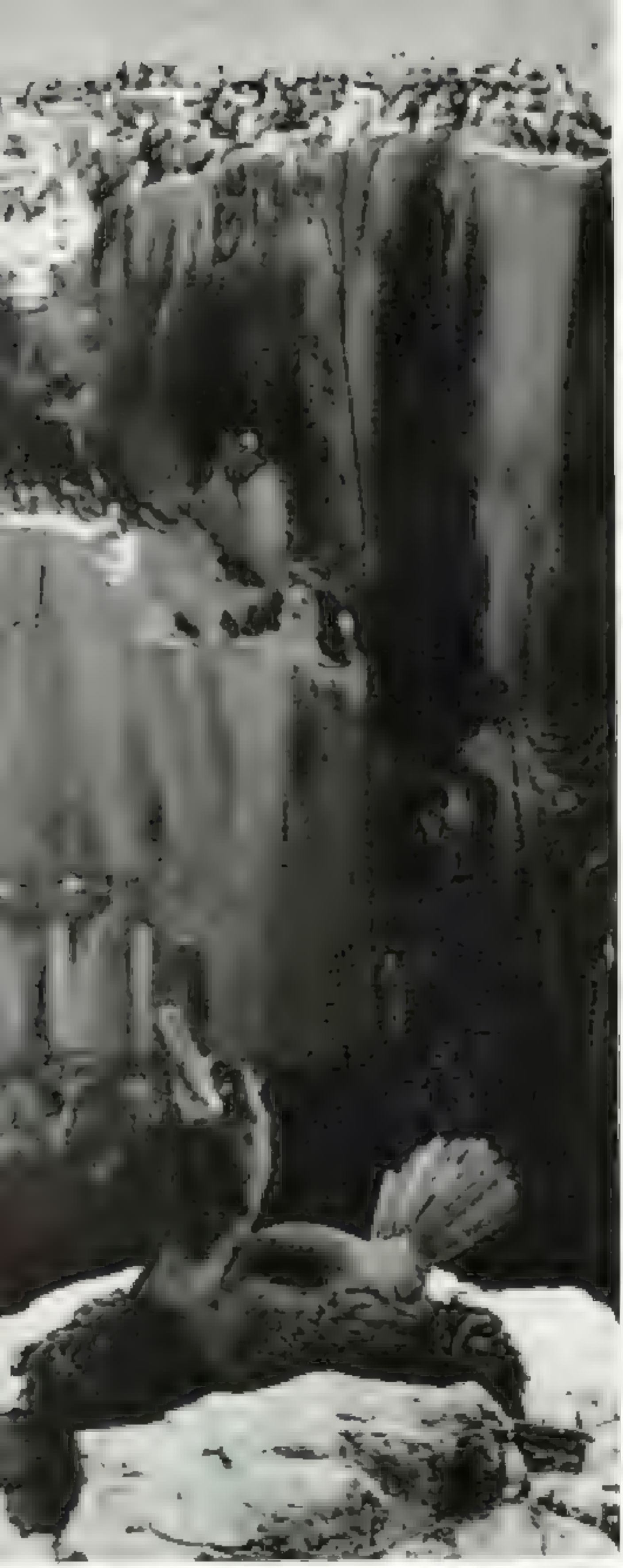
[illegible] was [illegible] Eventually, the city of [illegible] Wilson, [illegible] in 1809, the [illegible] Island and [illegible] to his old [illegible] A year [illegible] to [illegible] three [illegible] new [illegible] and still [illegible]

Some [illegible] to the [illegible] treacherous rocks that have become a [illegible]

Tide Submerges Many Farne Islets

[illegible] the [illegible] on [illegible] the largest [illegible] land. The Knivestone, which is completely [illegible] Staple Island [illegible] North and South Wamses [illegible] West [illegible] the Farnes [illegible]

Grace Darling's Light: a Shining Monument to a Heroic Rescue



Fussy Mrs. Shag Prefers Her Own Company

[illegible]

[illegible] I was [illegible] by a [illegible] voice calling me to Get out."

I was out of bed and dragging on my trousers, [illegible] that had [illegible] happened. Dream [illegible] hatch! We [illegible] of windows.

I knew that only one wall. We were [illegible] Kyle [illegible] of the Holy Island [illegible] of the [illegible]. I had [illegible] to the Lassie. Now [illegible] for an attempt.

Through the window [illegible] I saw [illegible] over us. [illegible] and drag-hooking [illegible] through the [illegible] that lay between Holy Island and these seagirt rocks.

We were able to sail at 6.15, so I quickly stowed some food and a [illegible] provided [illegible] by farmers and the Lowsleys.

[illegible] was stowing the [illegible] of sandwiches and [illegible]. There was no [illegible] breakfast.

The Winner Takes a Chance

For some months we were working [illegible], including [illegible] of the [illegible] Sabean Research upon Tweed. Our leader, [illegible] James R. Walker, was [illegible] eye [illegible] daily at the sky, depends [illegible] chance of [illegible] on the [illegible] for the [illegible] trip.

I saw his [illegible] greeting with "Is it yes or no?"

[illegible] "[illegible] the Clerke [illegible] 'Not [illegible] a bad.' [illegible]

"[illegible] Hunter, [illegible] Dyson [illegible] phone [illegible] it her name [illegible] Lady of Steel Land. It was too deep to [illegible] it to her [illegible] [illegible] dress.

Soon we were [illegible] through the narrows [illegible] between Black Law and [illegible] dangerous [illegible] single [illegible] pearl [illegible]. Instantly the mist [illegible] closed [illegible] the first [illegible] [illegible] heads a [illegible].

[illegible] skipper, once we were [illegible] of the [illegible] passed the tiller to [illegible] [illegible] as the [illegible] down to [illegible] the Scandia Sea, he said to me: "If we [illegible] a [illegible], we'll get there at [illegible]." I kept my fingers crossed.

We [illegible] were joined by four Arctic terns, one of the swiftest and most graceful of sea birds. Gyrating in the swallow-like [illegible] and turns, they kept [illegible] in an [illegible] into the sea.

Man and Puffin Give Each Other the Eye

Sometimes puffins [illegible] [illegible] [illegible] [illegible] [illegible]. [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. The [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible].

Two cormorants, first cousins to those that nest on the north shore of the Gulf of St. Lawrence, also arrived to feed. Big ugly fellows, in somber black and bronze and about three feet long, they also sought their meal beneath our [illegible], using their powerful wings in the breast stroke [illegible]. They appeared, however, to enjoy basking on the water before diving out of sight.

Next came a shag wearing [illegible] green. Almost as large as a cormorant and not unlike it in appearance, this bird is unknown in North America (opposite). This one was [illegible] [illegible] for the [illegible] [illegible] or Staple Island. When I [illegible] its long [illegible] a yellow [illegible] was revealed. A [illegible] was [illegible] [illegible] [illegible] [illegible] which had dropped into the water [illegible]. [illegible] these [illegible] [illegible] [illegible] their brown [illegible] heads appearing too large for their small bodies.

By now our little vessel had reached the [illegible] [illegible], and the Farnes [illegible] [illegible] [illegible] to the [illegible] rock with a distant slope to the northeast [illegible] like [illegible] [illegible] [illegible] the [illegible].

As we cruised in the Megstone I caught a heavy [illegible] [illegible]. One of the two [illegible] [illegible] [illegible] a permanent headquarters, the other the gunwale.

Cormorants Gulp 15 Pounds of Fish a Day

The rocks of Megstone, where [illegible] pairs of cormorants nest, were literally reeking with [illegible] and semi-digested fish, for each mature cormorant gorges itself at the rate of 15 to 16 pounds at times.

Our skipper, [illegible] up from his [illegible], winced, as did the watcher from Berwick-upon-Tweed, who seemed inured to the smell.

Largely uninhabited since [illegible] except by lighthouse keepers, the Farnes [illegible] [illegible], belonged to two families, one owning the Inner, the other the Outer group. In that year it was decreed that sea birds should be protected. For example, in the breeding season, [illegible] [illegible] [illegible] shooting [illegible] [illegible] vessels from the Tyne [illegible] along the cliffs [illegible] razorbills, guillemots, and other sea [illegible] for sport.

The [illegible] [illegible] Act put an end to this. [illegible] later the Farnes were bought through public subscription from the owners and [illegible] a [illegible] of the National Trust in 1924.

The [illegible] of the islands [illegible] [illegible] the [illegible] [illegible] and [illegible] [illegible].

[illegible] is the northern limit of the Arctic tern's breeding range and almost the southern limit of the [illegible] [illegible].

From May until the end of July, four bird watchers are employed to protect the birds of the Farnes, which nest on every pinnacle and ledge and in every [illegible] and [illegible] on the [illegible]. Some scarce land birds also find a harbor for their [illegible] the rock [illegible], where the watchers report [illegible] [illegible] plovers and [illegible].

As we veered away from the Megstone, we saw the dark rock of South Goldstone (Oxcar) fast vanishing beneath the tide. We steered between them, heading towards the Outer group of Islands.

From now on, George Kyle held the tiller. As we sped toward the North Wamses, I was startled momentarily by three strange apparitions—three bewhiskered, mummified-looking heads, which had popped above the surface to watch us go by.

These were representatives of the race of the gray seal, and the Farnes are their only breeding grounds on the east coast of Britain.

This species, found only in the North Atlantic and dependent waters, is the larger and rarer of the two British seals. It is protected in British waters by a special Act of Parliament.

Although the gray bull seal may measure from 7½ feet to 10 feet in length, most are about 8 feet long. The normal weight is between 500 and 650 pounds. The cows are smaller and lighter.

Music has a great attraction for seals. It was the late T. Russell Goddard, an authority on the Farnes, who said that he had only to sing "Blue Bells of Scotland" to have his friends appear.

The seals I saw varied considerably in color. One was a rusty black or dark gray all over; the second had gray upper parts, but the belly and especially the neck and chest were heavily blotched with cream. Their favorite food, so Mr. Walker informed me, is the lumpsucker; but they also eat large quantities of bivalve mollusks, including the common mussel.

As we passed Big and Little Harcar on our starboard beam, I saw the latter disappear except for one small hump at the southern extremity.

Grace Darling's Lighthouse

On rounding the Northern Hares, at the end of the Longstone, we gained a full view of Longstone Islet Light, Grace Darling's lighthouse, a massive column of red stone towering above its rock base (page 564).

Well I knew of the courage and fortitude that light had twice witnessed since it was erected in 1826. In the dawning hours of September 7, 1838, Grace, daughter of William Darling, the lighthouse keeper, glanced from the window to see a ship, the *Forfarshire*, broken in half on the Big Harcar. Joining her father, she and her mother helped him launch their little coble. Together they rowed nearly a mile through raging sea and rescued five of 11 survivors. Four others were rescued later by the father and two sailors.

By heroic effort they brought the survivors safely to the Longstone. Honored as a national heroine, she died four years later of tuberculosis and was buried where she was born, at Bamburgh.

In World War II four German bombs crashed on the Longstone. One demolished the subsidiary tower housing the unit that powered the great foghorn. The lighthouse crew fought flames from burning oil tanks under machine gun fire from the Heinkel above. Happily, they escaped unscathed.

Birds Make Rocky Pinnacles "Sway"

As we rounded the southern end of the Longstone on our run down to Brownsman's Gut, I caught myself gaping at three towers of natural rock. Some 60 feet high, they appeared to be gently swaying (opposite).

Mr. Walker nudged my elbow. "Those are the Pinnacles. A grand sight, aren't they?"

I asked why they sway.

"That's an optical illusion," he replied.

Then he told me that the impression of movement was caused by the thousands of guillemots packed on the flat tops of the rocks. "They're forever jostling and pushing," he said. "Their eggs are often kicked off and drop into the sea."

As we turned away from those pillars, I saw two birdbanders busily engaged in ringing the leg of a kittiwake. From distant Newfoundland and Davis Strait reports have been received of birds which have been banded on the Farnes.

Birds were everywhere on Staple Island. Never before, even on Lundy Island,* had I seen so many. Thousands filled the air, more thousands squatted on nests. They took little notice of us as we climbed up the naturally formed rock steps.

The noise was deafening. "Kyow-kyow . . . ki-ech-ki-ech" was the herring gull's litany. The kittiwakes joined in the chorus, "kitti-way-ake"; and I could have sworn that one kept repeating "keep-away-ye." A grating sort of growl joined in as bass, the "ar-harr-harr . . . ar-harr-harr" of the puffin.

A little way off, two bird watchers were collecting eggs of the herring and lesser black-backed gulls. Their numbers are rigorously kept down on the Farnes, as both species are pests in a bird sanctuary. They are capable of killing mature terns and even the tough little puffins.

Like the Inner Farne, a small portion of Staple Island is covered with boulder clay, which in places is 10 to 12 feet thick. On top of this is a layer of peaty soil, which gives sustenance to at least 50-odd species of

* See "Lundy, Treasure Island of Birds," by Col. P. T. Etherton, NATIONAL GEOGRAPHIC MAGAZINE, Mar., 1947.

Guillemots Crowd the Flat-top Pinnacles Like Excursionists on a Steamboat

[illegible]

[illegible] ing. The sea [illegible] is most [illegible] at the Farnes.

One interesting [illegible] was the [illegible]. It belongs to the [illegible] Islands and is a [illegible] of [illegible]. This [illegible] was [illegible] tall [illegible] lived on the [illegible] and kept poultry.

I saw not a single [illegible] of an island, though perhaps [illegible] have been [illegible].

I found only three buildings on Staple and the Brownsman. Two of these were former [illegible] as the [illegible] 18th [illegible] century. [illegible] built with [illegible] from the towers and now house [illegible] and watchers.

Before leaving Staple we saw the last [illegible] guillemots, [illegible] puffins, and oyster catchers. I might add a [illegible] curious fact. At first I thought they were guillemots. Their beaks, however, were thicker than those of guillemots, and instead of having dark-brown heads and upper parts they were black. This was the [illegible] nearest living relative of the extinct great auk.

The female razorbill normally lays only one egg and incubates it on the naked rock ledge. This bird is rare on the Farnes, for the marauding gull is forever seeking such an easily gained meal.

After we left Brownsman's Gut, Staple Sound gave us a fair passage across its mile-wide channel. Here and there the sea was so translucent that I might have been peering down into water of a Pacific atoll.

We cautiously circled the East Wideopen, where drowned sailors were once buried by the monks of the Inner Farne, and came into St. Cuthbert's Cove, on Inner Farne, its only landing place.

When I jumped ashore, I knew my feet were treading the same path that St. Cuthbert used 13 centuries before. At the very spot where our craft was now resting, this saint used to pray for hours at a stretch.

Zooming Terns Part Author's Hair

For the next few moments ashore, however, I was more occupied with the present than with the past. Hundreds of agitated Arctic terns were wheeling and slipping, zooming and dipping to within an inch or two of my head. One, in a dive, actually parted my hair with its swallow-like tail.

I turned to watch how my companions were faring. All except the veteran from Berwick and George Kyle were busily ducking and side-stepping.

Thousands of these birds nested close to the water's edge, where entrance was barred by strands of barbed wire. Some eggs had been laid below watermark, and now a bird watcher was removing them. He put each clutch into a new depression in the sand which he scooped with his hand.

"They always find their own eggs," said George Kyle, "though how they do, nobody knows."

The Arctic tern's cousin, the Sandwich tern (*Sterna sandvicensis*), is found mostly on the Brownsman and Longstone. It is a close relative of Cabot's tern, *S. s. acuflavida*, which breeds on the Atlantic coast from Virginia to British Honduras. The common tern, however, is not so common on the Farnes, though a few score keep the Sandwich company on the Longstone.

A short, sharp climb brought us to some ancient buildings. Passing through a wooden gate, we came into a neglected courtyard. A stone font, the history of which has been lost, stood in the center of the yard; to the right was an old chapel.

First erected about 1255 and practically rebuilt in 1370, this chapel was restored in 1848. It is the supposed site of St. Cuthbert's cell, which that saintly hermit divided into two. One part served as living quarters, the other as his oratory.

Another site bearing the same claim is Pele Tower (*pele*—Middle English for peel tower, or small castle), which faced us as we entered. This massive stone edifice, however, was not completed until 1500. The Benedictine monks had lived on the Inner Farne 250 years before they raised this building.

Which of these two claims is correct matters little. Somewhere within those few square yards of rough soil and rock, St. Cuthbert, the former Northumberland shepherd boy made his home between 676 and 684. In the latter year, much against his will, he was persuaded to accept the bishopric of Lindisfarne. But two years later, being convinced that his end was near, he returned here and died on March 20, 687.

Inside the tower, we followed a winding stairway up to the beacon. There my Berwick friend showed me where the monks kindled the fire that gave warning to passing vessels. "This was probably the first lighthouse on the northeast coast of Britain," he said.

As we descended those timeworn steps, my companion told me to strike a match. I was thankful I did, for another step would have plunged me into a stone cistern, filled with ice-cold spring water, that the early monks had used.

St. Cuthbert's Duck Sits Silently

When we were again outside, my friend told me to keep my eyes on the ground so as not to tread on any of St. Cuthbert's ducks known to ornithologists as the eider (*Somateria mollissima mollissima*).

Sure enough, as I deviated a little to one side to avoid a stone, I missed one bird by inches. It sat with its head close to the ground, making no move. This breed of duck, linked to St. Cuthbert's name, was carefully protected by the saint.

In a round and soft nest of sea campion lined with down plucked by the duck from its own breast, were five eggs. They incubate in 28 days; during that period Mrs. Eider may leave the nest only once or twice. If she does, she conceals the eggs from prying gulls under some down and herbage. During the four long weeks she eats nothing, but is sustained by the fat of her own body.

There were more than 300 eider nests in and around that old monastic courtyard, living evidence that St. Cuthbert's presence may still be felt by this strangely silent bird.

It was time for us to leave the Farnes. The eider stayed silent, but the other birds called after us, "ki-ock-ki-ock . . . ar-harr-harr. Keep awaaye . . . keep awaaye . . ."

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On November 11, 1935, in a flight sponsored jointly by the National Geographic Society and the U. S. Army Air Corps, the world's largest balloon, Explorer II, ascended to the world altitude record of 72,395 feet. Capt. Albert W. Stevens and Capt. Orvil A. Anderson took aloft in the gondola nearly a ton of scientific instruments and obtained results of extraordinary value.

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In 1948 The Society sent seven [illegible] to study the sun's eclipse [illegible] from Burma to the Aleutians.

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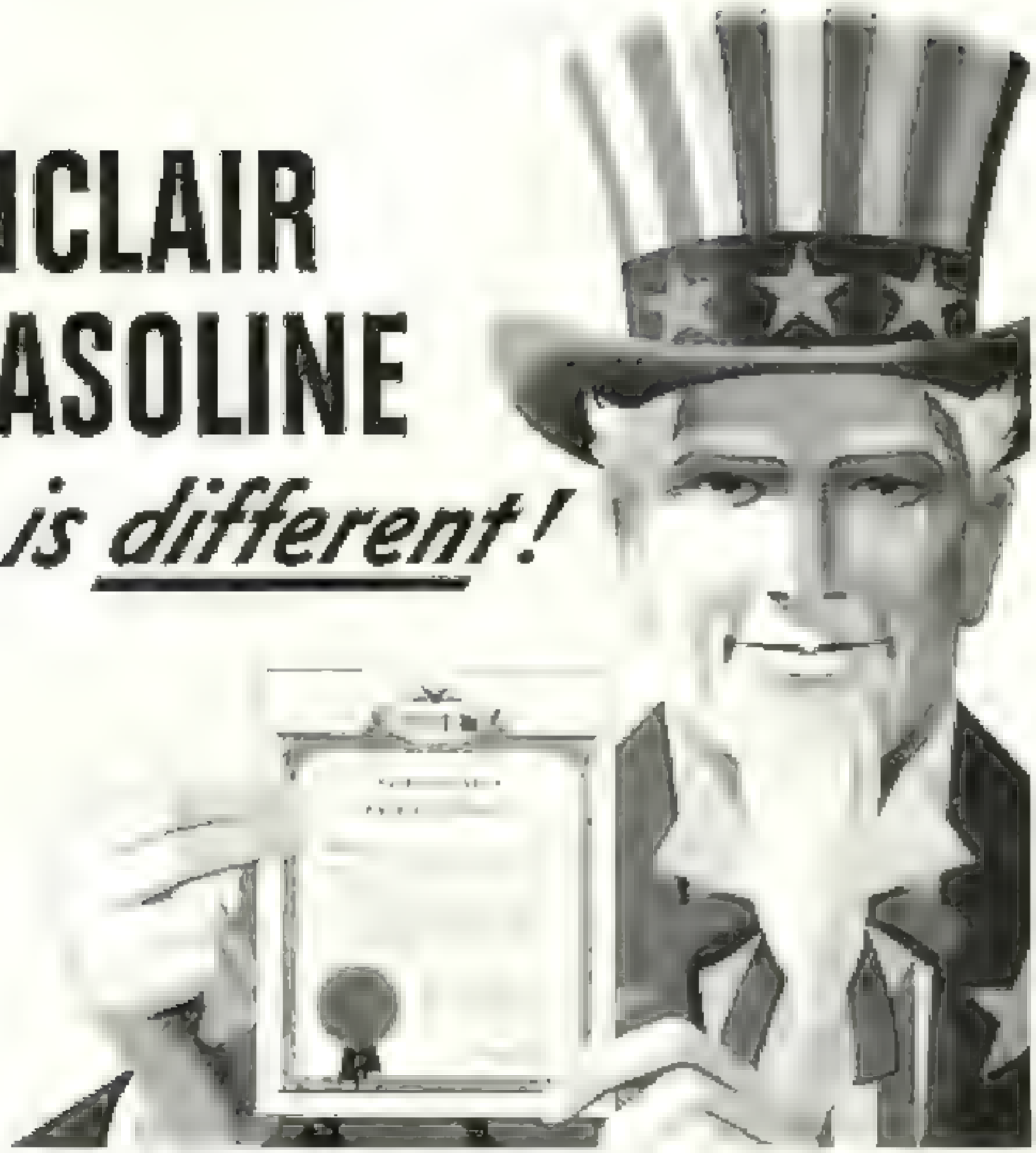

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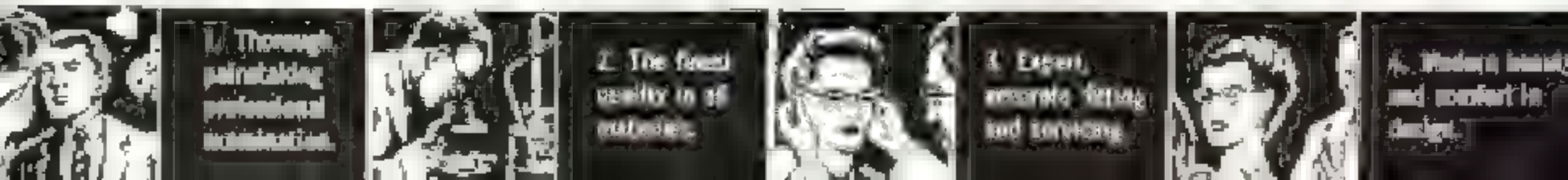

Home of Franklin Pierce, Hillsborough, New Hampshire

"Young Hickory" of the Granite Hills

HAWTHORNE, friend Franklin Pierce's, the years of one of his biographers, was the "most charming of all the Presidents" but had "too winning a personality for the position." Among many instances of his reconsideration for others is a story telling how, while President, he struggled through a blizzard to pay a call on Mrs. Jefferson Davis who was gravely ill. Almost anyone else, it was explained, would have looked the personal interest required to complete such an arduous task.

Pierce politics were known in his native New Hampshire. His opponents had his pro-slavery sympathies and his pro-Southern sympathies and congress was not regarded as "loyal" in Civil War. Nathaniel Hawthorne, his classmate at Bowdoin College and lifelong friend, claimed that his elevation to the Presidency never seemed an accident to his intimates.

When elected to the Senate, Pierce was the youngest member. He was an eloquent speaker but was dwarfed by such statesmen as Clay and Webster. Because of his wife's poor health and dislike of life in the Capital, he resigned before his term had ended in 1842 and returned to his law practice, declaring that he was permanently retiring from public life.

In the 1852 election campaign there were several strong candidates but on account of personal rivalries the Democratic convention became hopelessly deadlocked until Pierce was entered as a "dark horse" and nominated. Hailed as Young Hickory of the Granite Hills, in the election he defeated Whig candidate General Winfield Scott.

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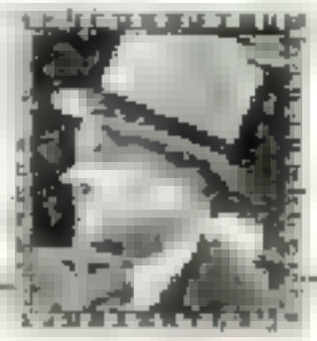

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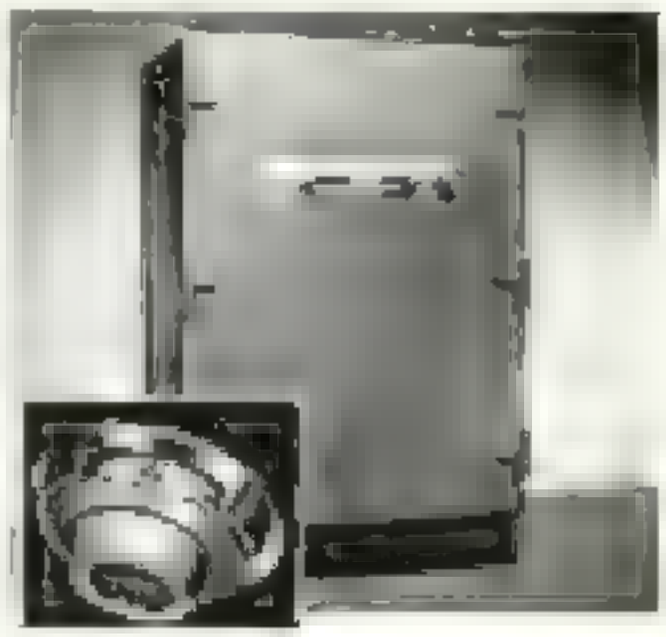

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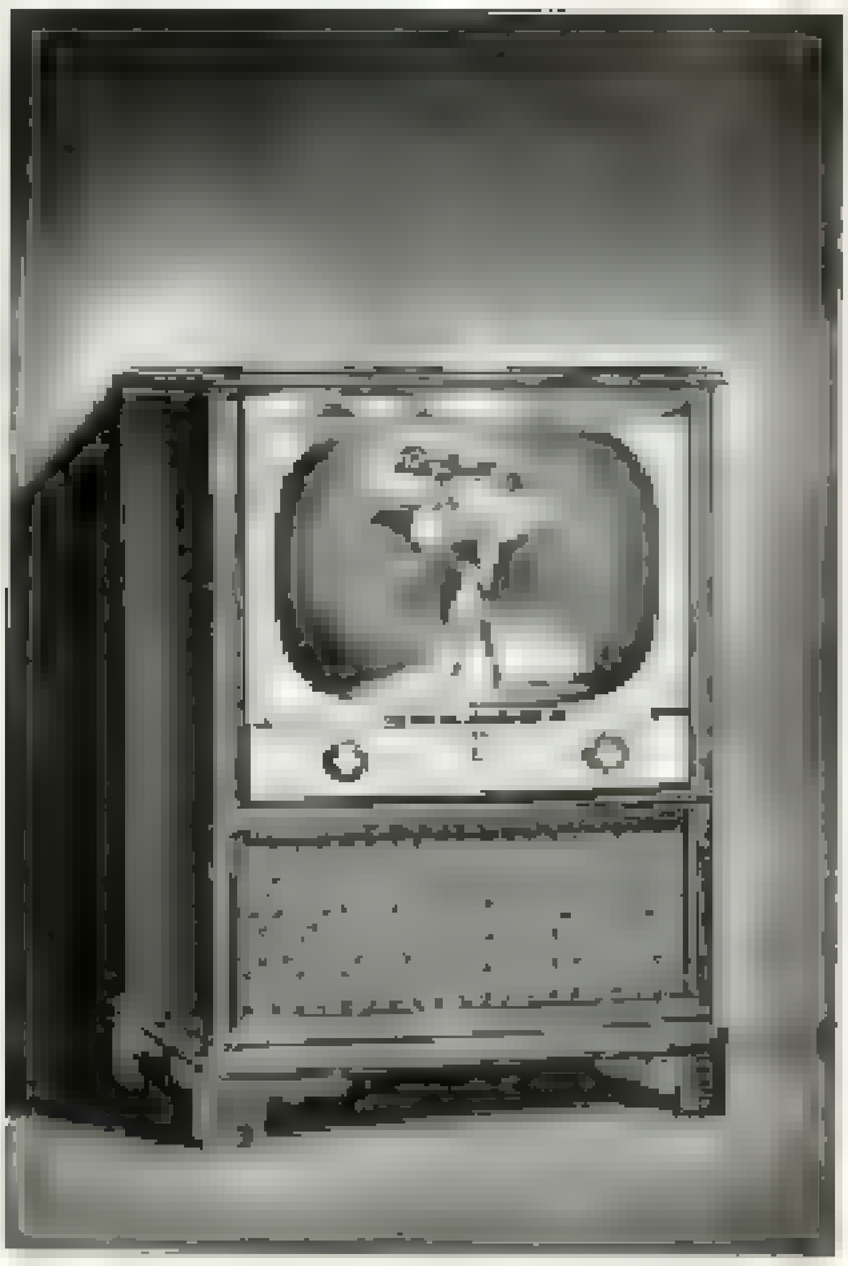

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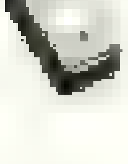

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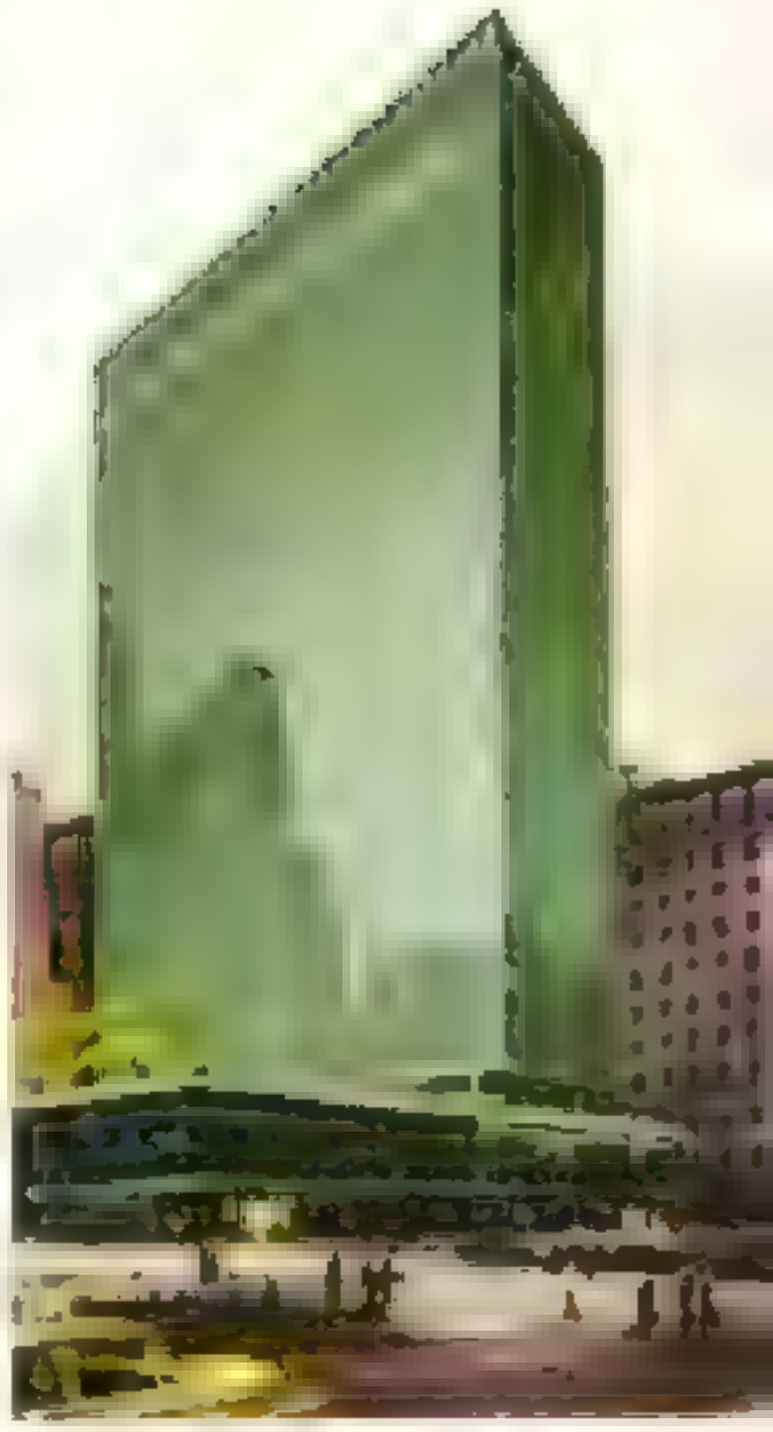

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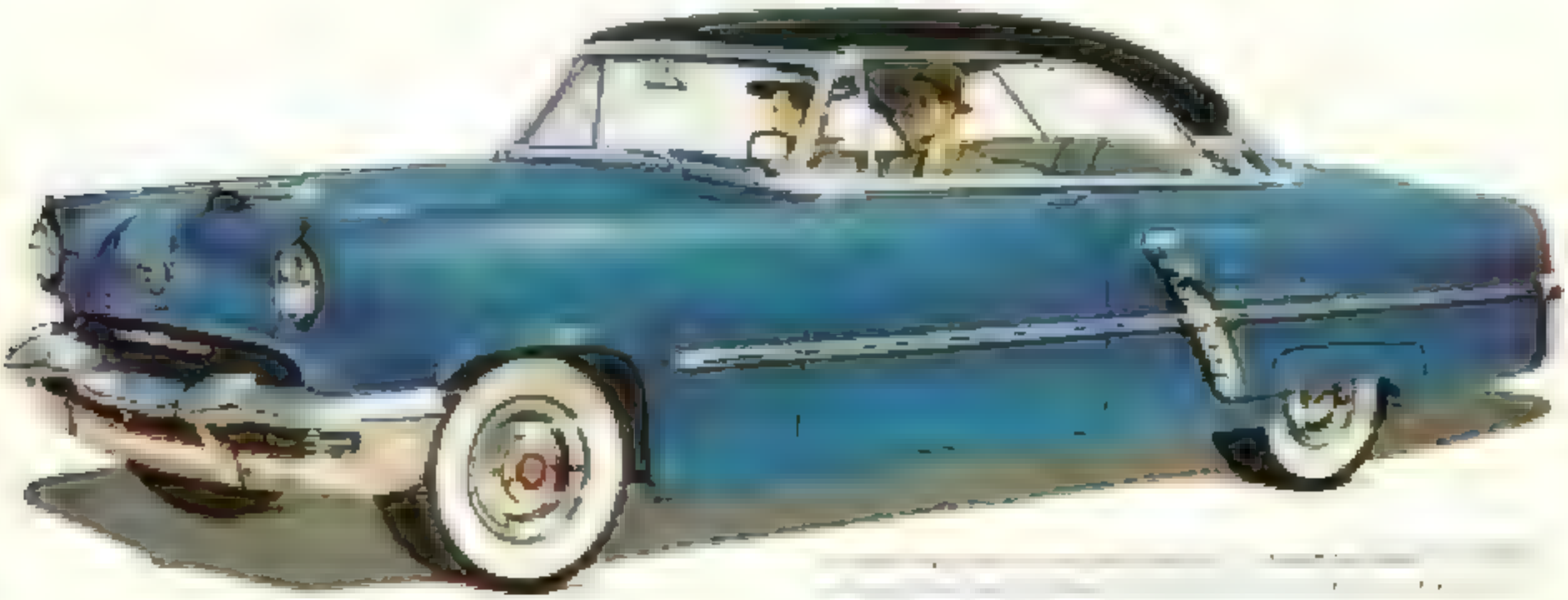

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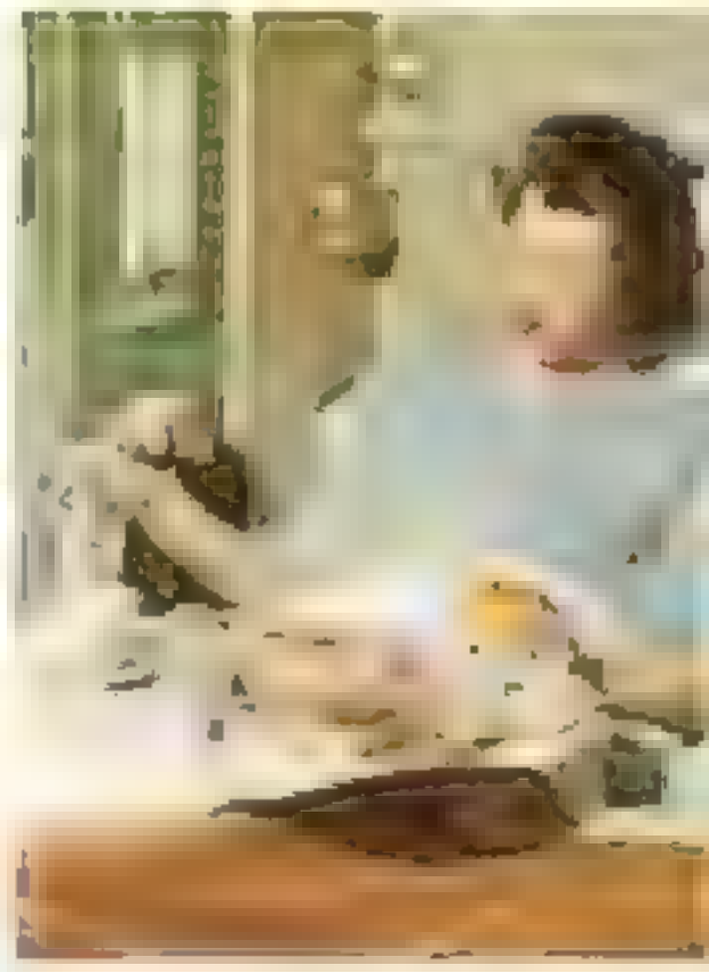

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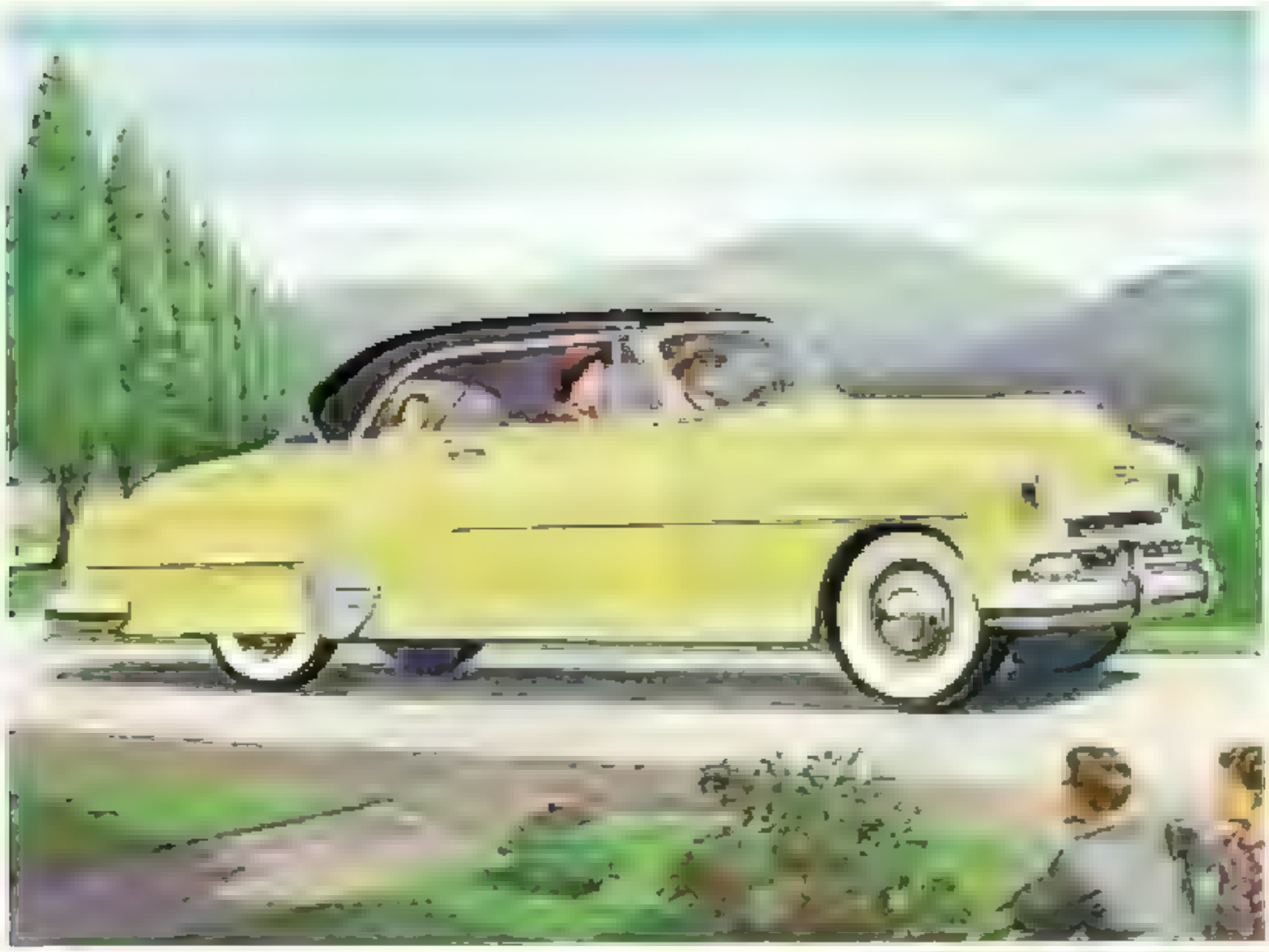

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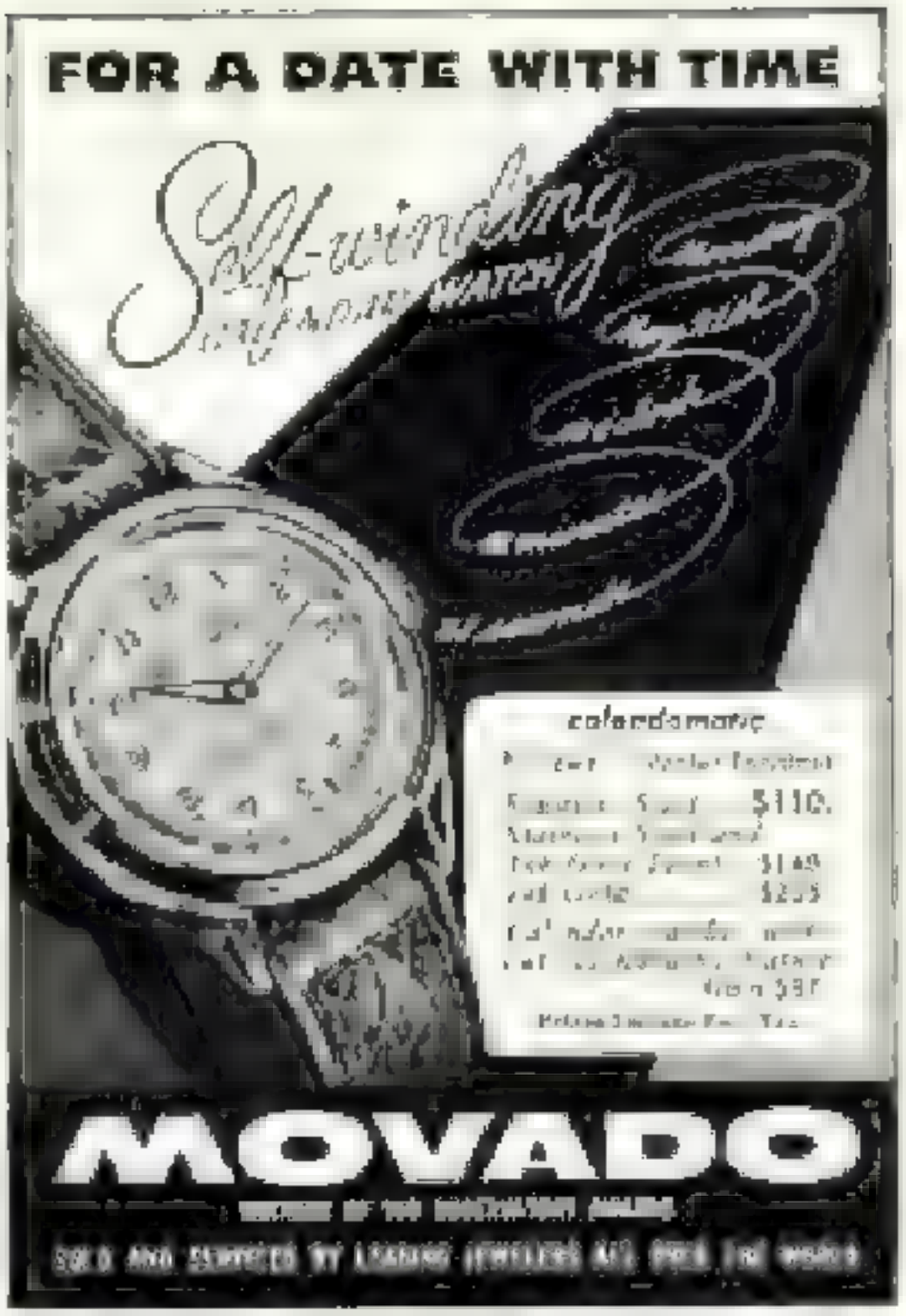

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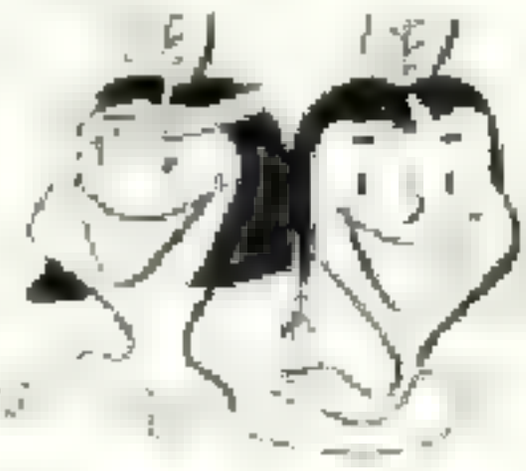

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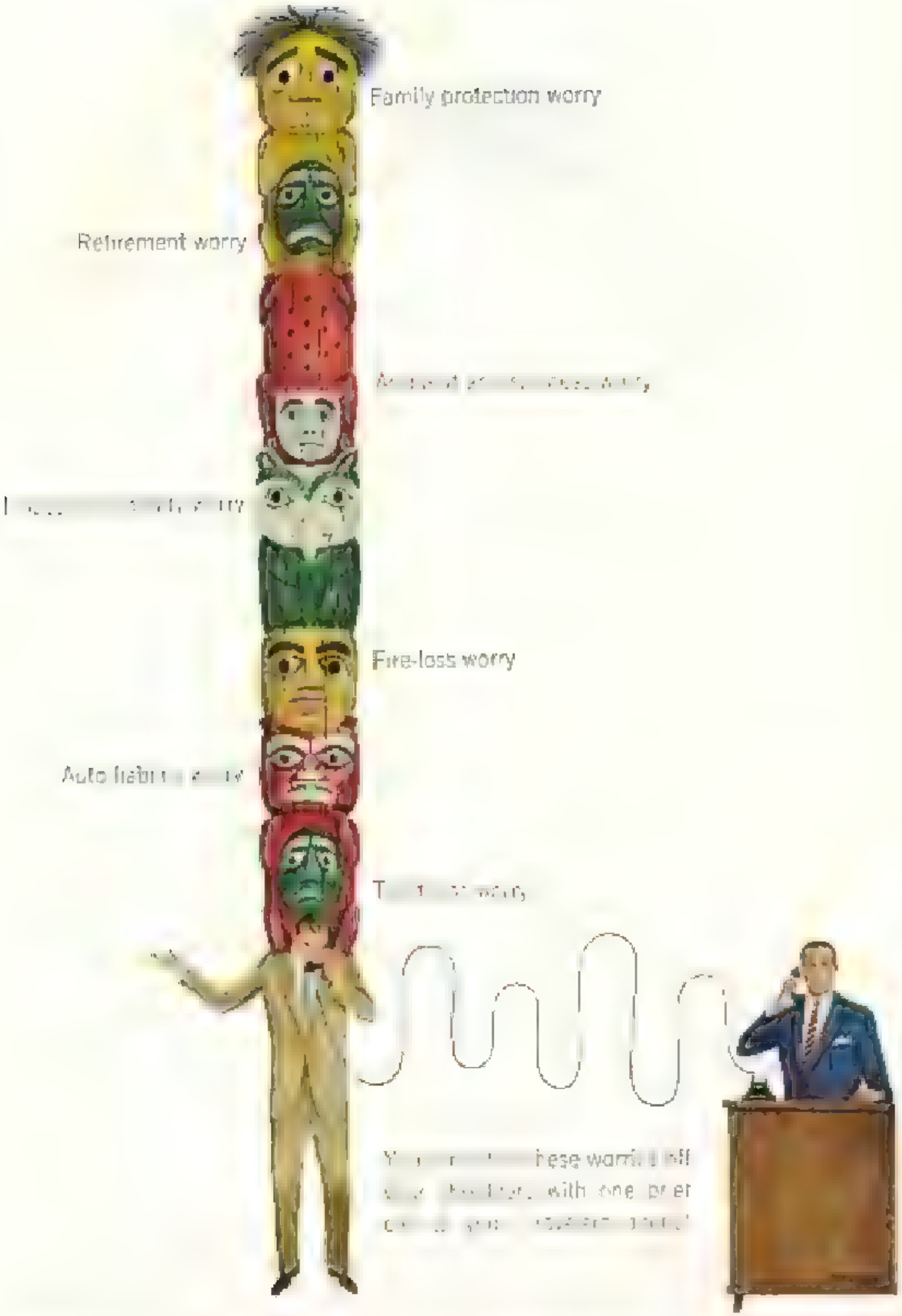
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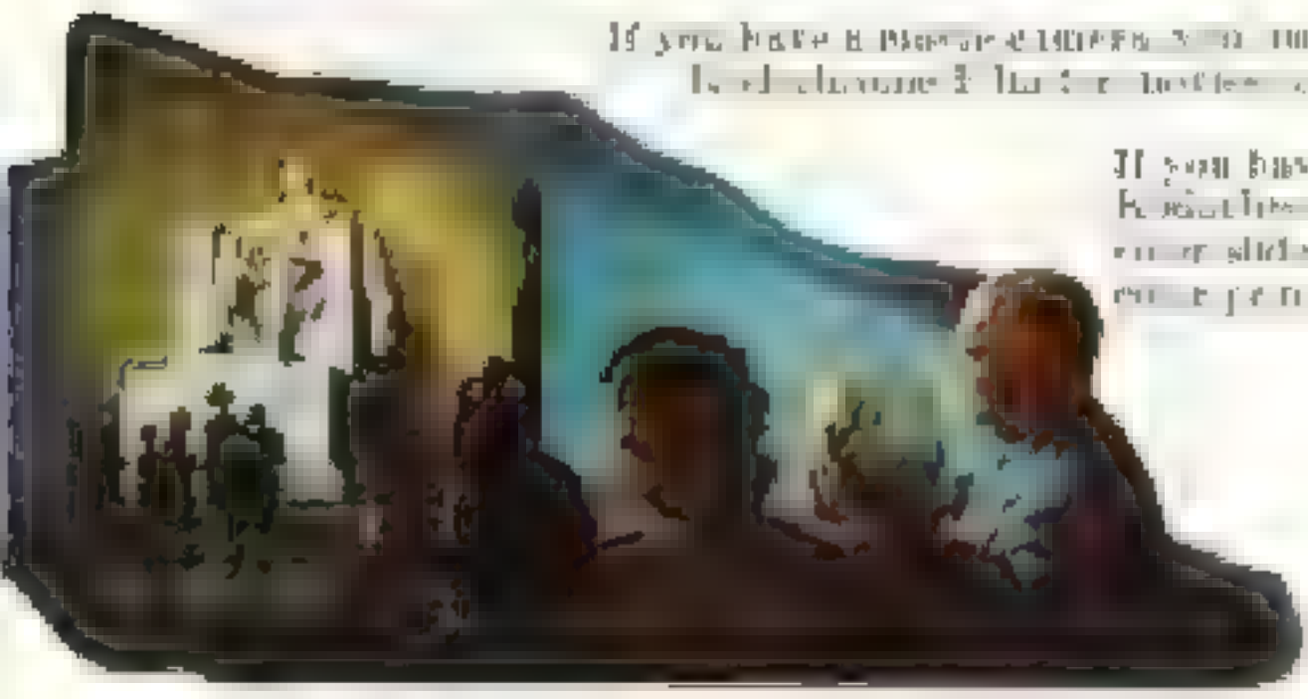

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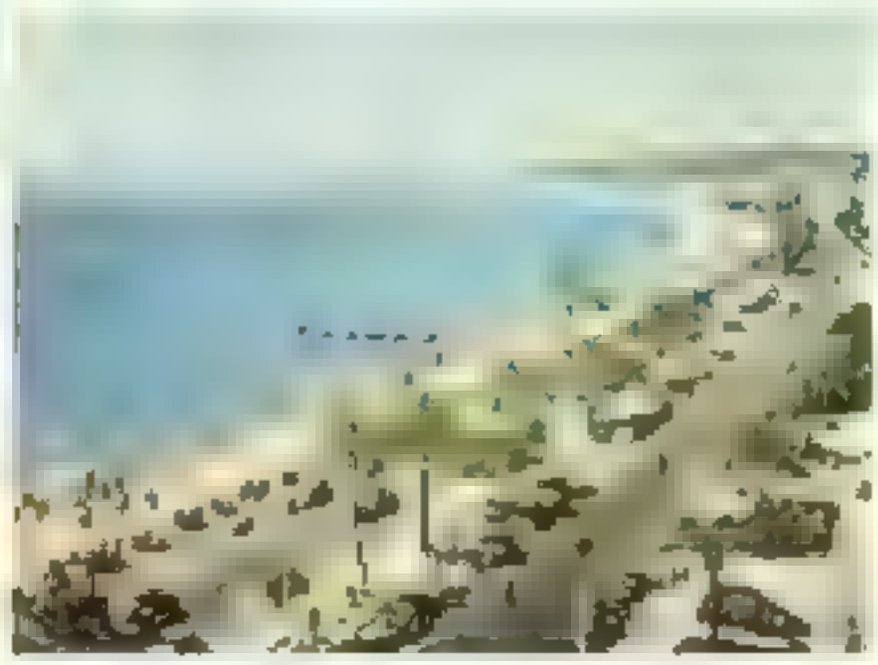

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